MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society

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Volume XVII | SEPTEMBER, 1934 | Number 9

PROGRESS IN 1934*

F. J. SAVAGE, M.D.

Saint Paul

LAST fall I was hunting back of Beaver Bay with a group of Duluth men, and on the opening day two of us together shot a buck. I said to my partner, "Art, I think this is your deer." His answer was, "This is *our* deer. That's the way I like to hunt." This little story illustrates my feeling about our progress in 1934. It is the result, not of the efforts of any one individual, but what we as a group have done.

Since January 1, I have been to Albert Lea, Grand Rapids, Aitkin, St. Cloud, Fergus Falls. Granite Falls, Wabasha, Fairmont, Stillwater, New Ulm, Olivia, Morris and Lake City. Almost everywhere the same spirit of good fellowship and coöperation has been apparent.

This same spirit of hearty coöperation has uniformly been shown by Dr. Meyerding and his entire staff. All of my requests have been met by prompt and efficient action. Dr. Meyerding's experience during the past years has been no small factor in the success of this meeting.

Our relations with the University have been most cordial. When I was at a luncheon with some of the medical faculty in honor of Dr. Bierring, he commented on the most unusual situation of the president of a state medical association being apparently on friendly terms with the faculty of the medical school. For some years Dr. O'Brien has assisted the Committee on Scientific Assembly in formulating their programs. The University at our request conducted a two-day post-graduate course. That our members appreciated this course was shown by a record-breaking registration of 128, more than three times that of any previous course. We are promised another short course this fall. The University Press has published the list of subjects drawn up by our Committee on Hospitals and Medical Education as a joint project of our Association and the University Extension Division, which the Extension Division is administering.

The State Board of Health has conferred with us on many occasions as to matters of policy, and I have been invited to many of their meetings. This year they are holding one of their regular meetings in Duluth at the time of our annual meeting, and they contemplate making this coördination an annual custom.

All these facts cited show closer coöperation with our society.

When we consider the progress we have made along scientific lines, we are struck first by the keen interest aroused in cancer. The Rector report has been a tremendous stimulus to this interest. This disease as a cause of death in our State has jumped from sixth place in 1900 to second place in 1930. Many county societies have conducted cancer meetings, Dr. O'Brien has given radio talks on the same subject, and through Dr. Meyerding's efforts 500 newspapers throughout the State have printed authorized medical news stories, including those on cancer.

Some of you know of Dr. Wilder's scheme to disseminate accurate simplified information on the treatment of diabetes by the publication of a pamphlet for the use of both physician and patient. I believe that the principle back of this idea is sound, but the information intended for the patient should be supplied through his physician. Diabetes now holds tenth place as a cause of death in Minnesota.

The Heart Committee of the Association is regularly publishing articles in MINNESOTA MEDICINE.

*President's Address presented at the annual banquet of the Minnesota State Medical Association, Duluth, July 17, 1934.

MINNESOTA MEDICINE, through its new Economics Department, endeavors to keep us informed of what vitally concerns our pocketbooks. Our Association has been criticised for devoting such a large percentage of its energies to economic affairs. My answer to such criticism is that those who offer it have been asleep for the past twenty years and need to wake up.

Many committee chairmen and members have generously given their time, their thought and their energy for the common good of our Association. A striking example is the way the St. Louis County Medical Society has worked for this 81st Annual Meeting. I congratulate this Society on their winning of the President's Cup. It should be considered a token of esteem and respect, and not from the President only. Because of the activities this cup acknowledges, public opinion in St. Louis County will also hold this group in high esteem. This sort of activity is helping to restore the position the family doctor once held in the public eye.

We feel, and I believe the State Board of Examiners feel, that they are a part of our organization. Their record of seventy-nine court convictions since the Basic Science law was passed presents a striking contrast to the record of the Board prior to 1927. Our Legislative Committee worked hard to secure the passage by the Legislature of the law under which the Board works. Mr. Brist speaks in the highest terms of the spirit of coöperation he has received in his work of law enforcement not only from our Attorney General but from the various county attorneys throughout the state. Our organization and the Board are fortunate in having the services of an attorney who is fearless and alert and who knows the law. One of the most outstanding events of the year has been the court decision handed down in Ramsey County that a corporation cannot practice medicine. This case was handled by the Attorney General's office in coöperation with the State Board of Medical Examiners. If this decision had been the reverse, every community in the State would have been menaced by a corporation run by laymen for their own profit, and giving medical and dental services for $1.50 per month.

The chairman of our Legislative Committee reminds me of the motto of the Pinkerton Detective Bureau, "We never Sleep." Whether the Legislature is in session or not, he is always keen and alert for the welfare of his fellows.

A committee, new this year, to study the matter of medical care in isolated communities met in Grand Rapids in February. The personnel of this committee included a representative group from the northern zone of the State. The conclusion reached was that, because of the automobile and good roads, there is no marked absence of medical care in this area. One man pointed out the obvious fact that thirty miles today is no greater than five miles thirty years ago. We should not, however, lose sight of the fact that in Saskatchewan, across the Canadian line, there are thirty-five communities served by tax-supported physicians.

The picture presented in the care of the indigent has been kaleidescopic. Our Organization has had many meetings with the Board of Control and State officials representing the Federal Relief Administration. One month there are 1,100 nurses working throughout the state, and shortly afterward, when the money is gone, there are fifty. One month there is money to pay physicians a fee reduced 40 per cent for the care of relief cases and the next month talk of tax-supported physicians. The Board of Control does not know, except from month to month, how much relief money is available. This is a serious handicap to them for anv coördinated and continuous program. I believe the fee schedule finally adopted was reasonably fair. The Board has questioned some physicians' bills; so, in conference with our Association, a plan has been instituted of referring questionable bills to some physician in the locality in which the service was rendered, with the councilor of that district acting as intermediary. The Board has had a good deal of pressure brought on it to use chiropractors, osteopaths and optometrists in relief work rather than physicians. I have yet to hear of any of these practitioners supplanting physicians. By action of the Council, a telegram was sent to Washington pledging support to the President's program of relief as an emergency measure, but expressing the hope that, in matters of medical relief, existing agencies would be used instead of new agencies set up. We have advocated this same principle to the Board of Control.

We are proud of our Woman's Auxiliary. We look on them as a powerful factor in Public Health Education and as a great reserve force to

be called into service on command in our fight for economic independence.

Finally we approach a problem which in my opinion is one of the greatest which confronts organized medicine: that of the over-production of physicians, not only in Minnesota, but throughout the country. The Committee to Study the Limitation of Physicians to be Licensed in Minnesota has presented a very fine fact-finding report; but I think that their recommendations are inadequate. It would put an unfair burden on our State Board of Examiners to force them to select a limited number of applicants for license when all of the candidates have successfully passed their examinations. It is also obviously unfair to allow a candidate for the degree of M.D. to spend five of his best years in the study of medicine, which does not qualify him for any other line of work, and then drop him.

It is my belief that the solution of the problem must be by two methods: (1) by a weeding-out process to begin in the Pre-Medical Course through a system of rating by a committee of the medical faculty, a plan already advocated by Dr. Bierring; (2) by a limitation, also based on a rating system, of those who are allowed to matriculate. From statistical studies already made this number is definitely established; there is no guesswork about it. Your Committee makes the suggestion that what Minnesota may or may not do does not affect the general situation in the United States. In my opinion this is not true. I am given to understand that in the House of Delegates of the American Medical Association Minnesota occupies a position of leadership. What we as a State may do along this line is likely to have a profound effect over the country. If the present generation of physicians is to avoid the finger of scorn being pointed at them by their successors thirty years hence, we must take action. What is more, we cannot expect the Medical School to take the initiative. The responsibility is squarely on the shoulders of the Minnesota State Medical Association. We have reached the stage where action, and not further statistical studies, is indicated.

DIABETES IN MINNESOTA*

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Rochester, Minnesota

DIABETES has come to assume a position of major importance as a public health problem. Fifty years ago, deaths from this disease were infrequent. The mortality then was only 2.8 per 100,000. Even at the turn of the century the disease was twenty-seventh in rank among the causes of death. It is now in the ninth or tenth position, and if deaths from accident and congenital conditions are excluded, it occupies seventh place. The ratio of diabetic deaths to total deaths was 0.14 in 1880; it is now 1.84, having increased thirteen fold.

The Census Bureau was alert to the importance of the problem as early as 1906, and in 1909, in the volume "Mortality Statistics," the following statement appeared: "Of comparatively trifling importance as a cause of death, diabetes shows a slowly progressive tendency to increased mortality, perhaps dependent as with cancer upon the advancing age distribution of the population." The discovery of insulin in 1921 led to the expectation that some decline in diabetic mortality would follow, and in 1923 and 1924 there was a decline from 18.4 to 16.5 per 100,000. Then the rate increased again, and a steady advance has followed, reaching 22 per 100,000 in 1932 (Fig. 1). These data are for the nation. Those for Minnesota will follow.

The United States has a greater death rate from diabetes than any other country of the world (Fig. 2)). The Netherlands come next with a rate of 17.7. Japan is at the foot of the list with only 3.5 per 100,000. These figures

*Read as a part of the report of the Committee on Diabetes of the Minnesota State Medical Association, Duluth, July 16, 1934.

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are from a recent article by Joslin, Dublin and Marks. It should be noted that Canada has a rate of only 12.8, and that in the United States itself the rate is quite inconsistent, being highest in Massachusetts, New York, Illinois, Kansas and Nebraska and lowest in the southern tier of states (Fig. 3). In Southern Europe, as in our Southern States, the rates are lower than in the more northern latitudes, but despite this irregularity the general increase in rate is world-wide; few countries or localities have escaped it.[5]

There is little agreement as to the reasons for this increasing importance of diabetes as a cause of death. It is not to be explained by greater accuracy of diagnosis. Cabot found that diabetes was correctly diagnosed in 95 per cent of cases

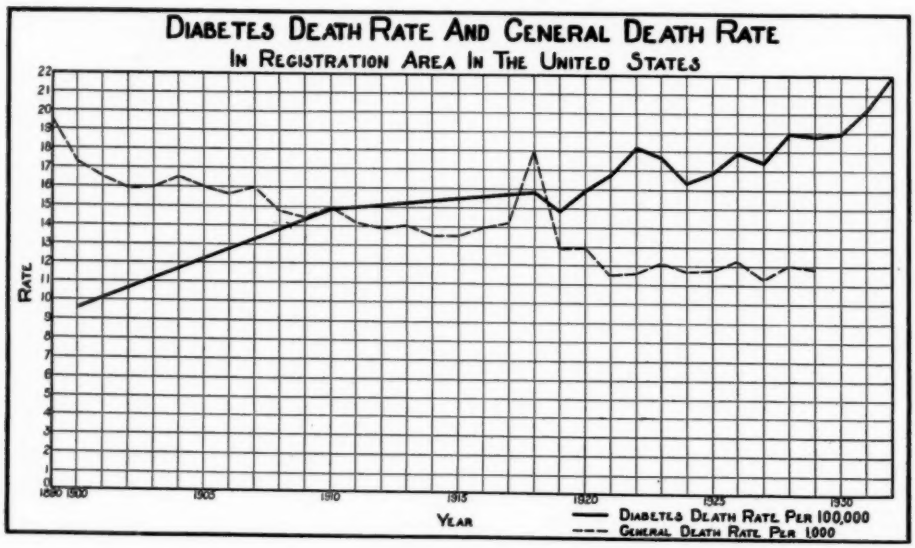

Fig. 1.

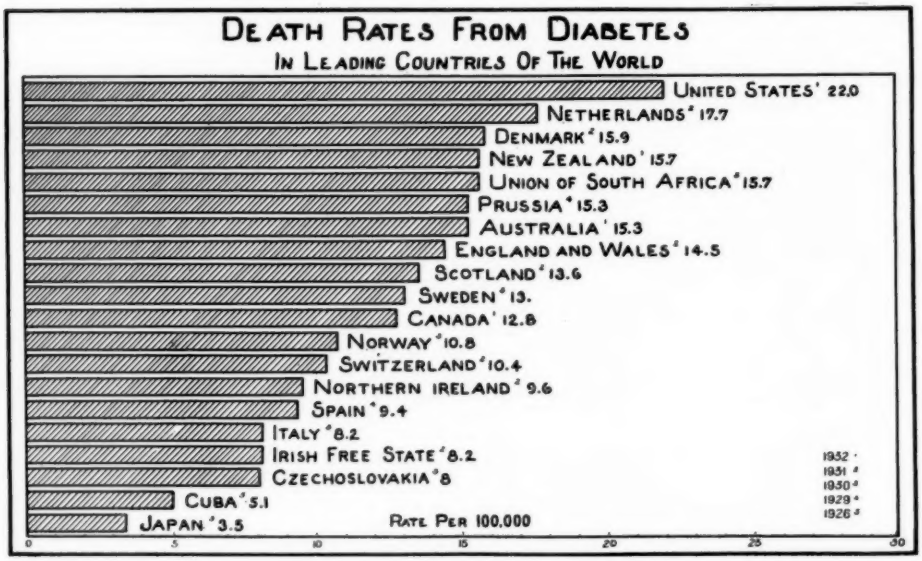

Fig. 2.

coming to necropsy, and his observation was made in 1912. The simple test of the urine on which the diagnosis is based has not materially changed in the last thirty or forty years.[9] Nor work by Pincus and White does much to establish as a fact. If we are to decrease the incidence of diabetes, we must concentrate on families in which the disease has already appeared. Obesity

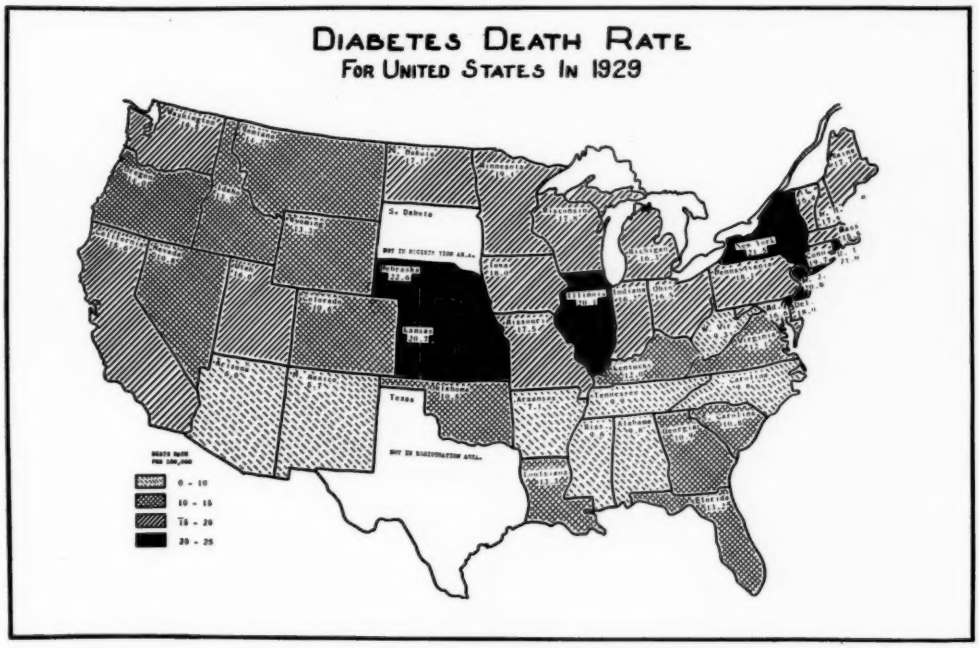

Fig. 3.

does the increase of the duration of life of the general population account for it entirely, since the rate of increase in diabetic deaths is many times the rate of increase in the average survival age of the population and, also, the death rate from diabetes is advancing much more rapidly than is that for other diseases of the aged, such as cancer.

A recent survey made by the Metropolitan Life Insurance Company[11] and the study of Joslin, Dublin and Marks reveal a factor of puzzling significance, namely, that the increase in mortality from diabetes is not uniform when analyzed from the standpoint of sex, age and race. The death rate among older women is advancing rapidly and overbalances, and thus obscures, a definite though small decline in the death rate among the young. This is true in England and on the Continent as well as in the United States.

The relatively high mortality rate among the Jews is attributed in large part to intermarriage of persons from diabetic families. That diabetes is inherited is an old hypothesis which recent should be discouraged among members of such families; eating sugared foods should be restricted; and intermarriage among families similarly affected must be opposed.

The Situation in Minnesota

Parallel to the death rate from diabetes in the United States registration area as a whole is the death rate from diabetes in Minnesota. In 1929 Minnesota was seventeenth on the list of states reporting on this disease.

The number of diabetic deaths in the State, in 1915, was 366; in 1932, the number was 579. This represents an increase in the death rate from 16.40 to 22.37 per 100,000 of population. In the five-year interval which preceded the introduction of insulin, the average death rate was 15.8; in a recent five-year period it was 20.8. This is an increase of 32 per cent in the face of what Joslin and his coworkers call "the amazing progress that has been made in the treatment of the disease."

Diabetes is now in tenth place among causes

of death in Minnesota, being responsible for 2.5 per cent of all deaths. It challenges tuberculosis. The rate for tuberculosis, in 1915, was 102; this had fallen, however, to 41 in 1931, whereas the figure for diabetes had risen from 16.4 to 22.4 (Fig. 4).

A chart of the total deaths from diabetes plotted against the total deaths from carcinoma, the total deaths from all causes, and the total population in Minnesota, is instructive (Fig. 5). The lines for population and total deaths follow each other very closely; both rise gradually. The

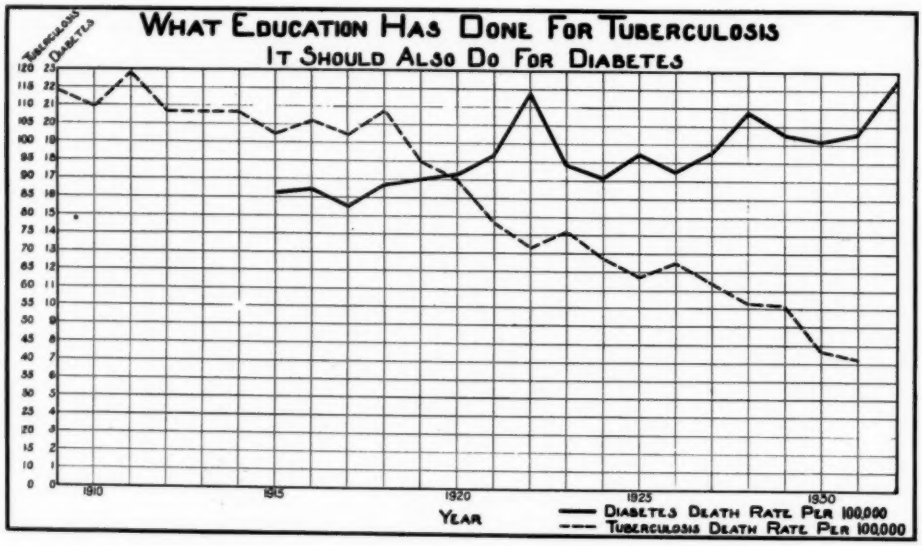

Fig. 4.

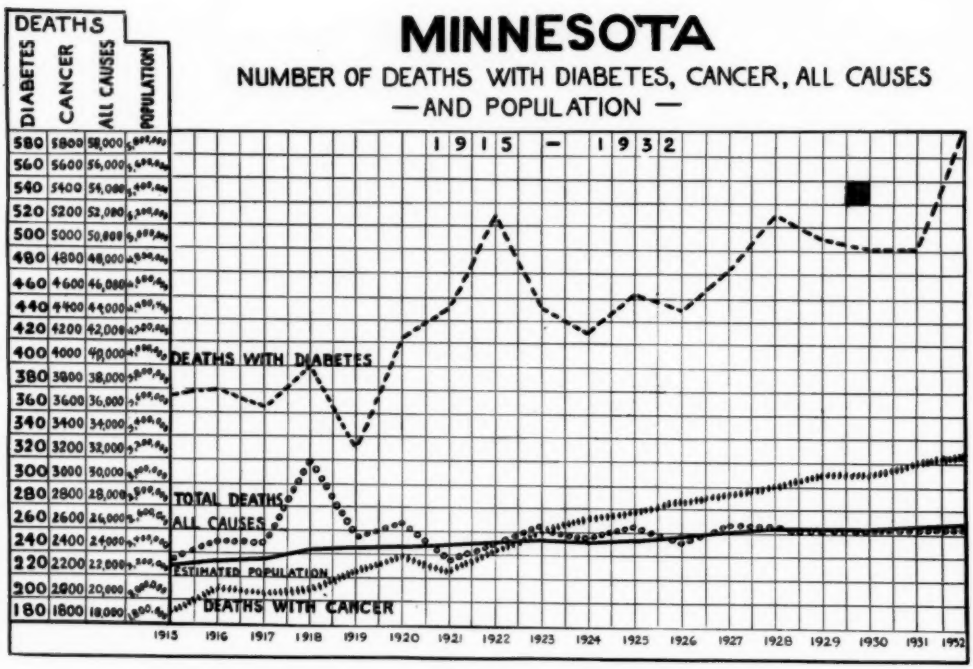

Fig. 5.

line for deaths from carcinoma rises smoothly but more rapidly than these two, whereas that for diabetes rises most rapidly of all. If we attribute the increase in cancer to the increasing number of people living into the so-called cancer age, then only a part of the increase in diabetes can be explained by the population, and the difference between the rate of increase for diabetes and that for cancer represents some factor other than age which is provoking deaths from diabetes. If this continues to operate for only a few years, diabetes will outweigh cancer as a public health problem.

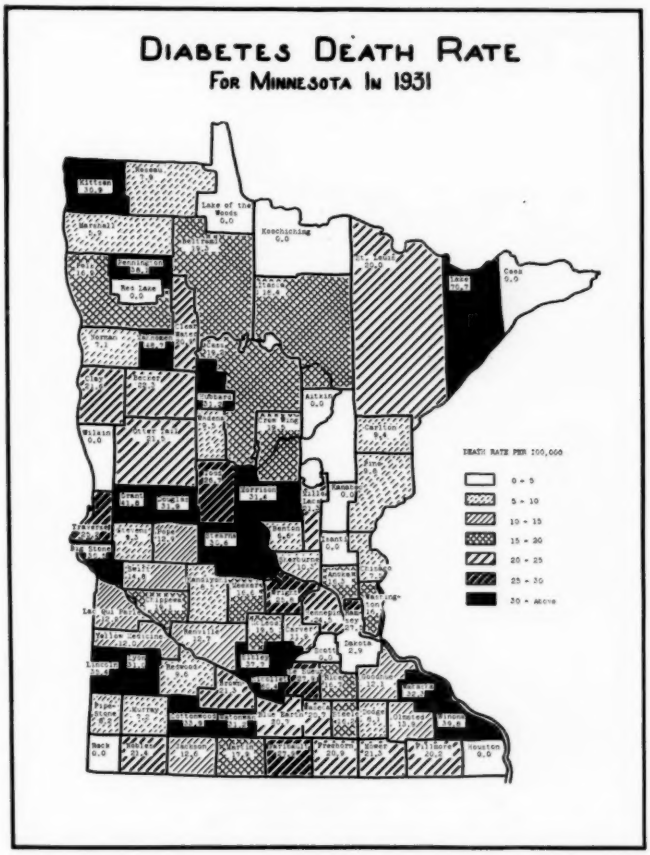

Fig. 6.

In 1931, the diagnosis of diabetes was made on 547 death certificates, and with the assistance of the State Board of Health, letters were sent to the physicians who signed these certificates enclosing a questionnaire designed to determine the part played by this disease in the cause of death. Three hundred seventy-five replies were received, and the following information is based on this survey. The distribution of the deaths by counties is shown in Figure 6.

TABLE I. AGE AND SEX DISTRIBUTION OF 547 PERSONS WHO DIED: DIABETES WAS REPORTED AS THE CAUSE OR AS A CONTRIBUTORY CAUSE (MINNESOTA, 1931)

Age, years	Males	Females	Total	Per cent of 547*
0– 9	5	4	9	2
10–19	12	11	23	4
20–29	5	7	12	2
30–39	9	4	13	2
40–49	20	21	41	7
50–59	31	46	78	14
60–69	69	93	162	30
70–79	62	94	156	29
80–89	21	31	52	10
90–99		1	1	
Total	235	312	547	100

*Nearest whole number.

Of the 547 persons who died with diabetes in 1931, 235 were males and 312 females (Table I). There was an almost equal incidence of males and females for the first five decades of life but, thereafter, the females greatly exceeded the males. Of those more than fifty years of age who died with diabetes, 265 were women and 183 were men, whereas the distribution of the general population of the State by sex is about equal for these ages. The predilection of diabetes for older women is thus apparent in Minnesota as it is elsewhere.

Less than 11 per cent of those who died were under the age of forty years (Fig. 7). This figure is like that in the report of Ross and McKinnon, who found the percentage of diabetic deaths below the age of forty to be only 14.4 in 1930 as compared to 31.9 in 1922.

A diabetic person cannot, of course, attain immortality and he must ultimately die from some cause or other, but diabetes itself should not kill. Deaths from diabetic acidosis and coma are preventable, yet coma was responsible for death in 105 of the 375 cases in which replies were received to the questionnaire (Table II). These deaths might have been avoided. The diabetic death rate should be 28 per cent lower than it is. The explanation for our failure to prevent these deaths is as follows: Of the patients in these 105 cases, only sixty-six, or 63 per cent, received insulin at any time during the course of the disease, and only half of them received

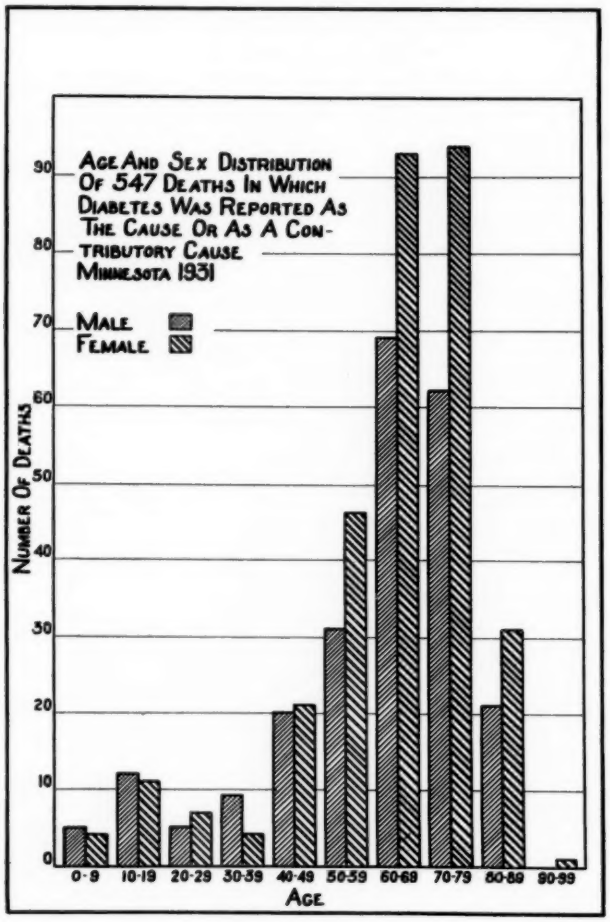

Fig. 7.

TABLE II. PRIMARY CAUSES OF DEATH OF 375 DIABETIC PATIENTS AS DETERMINED BY QUESTIONNAIRE (MINNESOTA, 1931)

		Cases	Per cent of 375*
Uncomplicated diabetic coma		105	28
Cardiovascular and renal disease			
Gangrene	44 (12%)		
Cerebral accident	28		
Heart disease	27		
Coronary disease	18		
Hypertension	7		
Nephritis	10		
Miscellaneous	8		
		142	38
Infections exclusive of tuberculosis			
Pneumonia	21		
Communicable disease other than pneumonia	2		
Septic infections, boils and so forth	34		
		57	15
Carcinoma		4	1
Tuberculosis		10	3
No cause of death given		19	5
Miscellaneous			
Fractured hip	8		
Heat stroke	4		
Postoperative shock	4		
Hyperprostate with retention	3		
Gastric hemorrhage	3		
Senility	3		
Intestinal obstruction	3		
Mesenteric thrombosis	2		
Peripheral neuritis, auto accident, bulbar palsy, vaginal bleeding, transverse myelitis, suicide, acute pericarditis, and pernicious anemia, one each	8		
		38	10
Total		375	100

*Nearest whole number.

insulin during the final illness when acidosis was developing and it was needed most urgently (Table III).

In the experience of the Metropolitan Life Insurance Company, deaths from coma accounted for 41 per cent of 1,044 diabetic deaths in 1929. In a more recent series the figure had fallen to 37 per cent. The figure for Minnesota, as was stated, was 28 per cent, from which it would appear that we are somewhat more enlightened than the average; this, however, is not enough. What we should aim at is the accomplishment of the city of Stettin[3] in Germany, where, in a population of 270,000, the number of deaths from coma was reduced to one in 1928 and to none in 1929 and 1930, as the result of a special diabetic campaign. This was accomplished by education of both patients and family physicians.

Cardiovascular-renal disease was responsible for 142 deaths, or 38 per cent, in our series (Table II). In forty-four of these cases, or 12 per cent of the series, gangrene was present at death, a percentage which is smaller than that

TABLE III. USE OF INSULIN IN 105 CASES IN WHICH PATIENTS DIED DUE TO UNCOMPLICATED DIABETIC COMA, AS DETERMINED BY QUESTIONNAIRE (MINNESOTA, 1931)

	Cases	Per cent of 105*
Uncomplicated diabetic coma deaths		
Insulin used	66	63
No insulin used	39	37
Insulin used during final illness	52	50
Insulin used during final illness only	13	12
Refused insulin	27	26
Too poor to buy insulin	20	19
Dependence on quackery or faith cure	5	5

*Nearest whole number.

TABLE IV. SUMMARY OF INFORMATION OBTAINED FROM QUESTIONNAIRE CONCERNING 375 DEATHS ATTRIBUTED TO DIABETES (MINNESOTA, 1931)

	Cases	Per cent of 375*
Insulin used	235	63
No insulin used	127	34
No record of use of insulin	13	3
Insulin used during final illness	187	50
Patient too poor to buy insulin	47	12
Charity hospital patients	28	
	Total 20%	
Attempts made to secure insulin Allowed by charity Refused by charity Patient refused to accept charity	23 17 5 2	6
Weighed or measured diet used	147	39
Urine tested by patient or guardian	172	46
Other cases of diabetes in household	13 instances	3
Insulin used sometime during the course of diabetes and final illness	130	35
Insulin used during final illness only	50	13
Insulin used sometime during the course of the diabetes but not during final illness	47	12
Insulin used without measured or weighed diet	39	10

*Nearest whole number.

reported in other similar series.[4] We can take some credit here: gangrene frequently is preventable. Infections of all types, exclusive of tuberculosis, were responsible for fifty-seven deaths, or 15 per cent of the series. Tuberculosis as the cause of death occurred in only ten cases and cancer in only four.

Mention has been made of the number of patients dying from coma who failed to receive insulin. In the entire series the percentage of those who did not use insulin at any time was 34 (Table IV). This is not too creditable. Although many persons with mild diabetes can do without insulin, there probably are few of them who would not benefit by it during the illness that leads to their deaths. There were forty-seven patients who used insulin sometime during the course of their disease but not in the final illness. The reasons for discontinuing it were not always obtainable, but several physicians supplied this information. Three patients resorted to the healing virtues of one or another of the various "cults"; nine refused to use insulin any longer for reasons not given, and several others were too poor to buy it. In a good many cases it appears that the physician was remiss. In some cases he failed to have confidence in the drug; in others he failed to use it as heroically as is often necessary in the presence of diabetic acidosis. The group of patients who used no insulin at any time included thirty-seven who died in diabetic coma and ten who died with gangrene.

Of the forty-seven persons who were too poor to buy insulin, twenty-six died with uncomplicated coma and six with gangrene. Twenty-three of these patients had made unsuccessful attempts to secure insulin from charitable organizations.

That the general management of diabetes in the State of Minnesota is not what it should be is perhaps best indicated by the fact that only 39 per cent of these patients had at any time followed a weighed or measured diet, and only 46 per cent had learned how to test the urine for sugar. Thirty-nine patients who were using insulin used it without any regard to diet and without testing the urine. These data are comparable to those published by Holcomb, Palmer and Defries and Ross (Table V). In Ontario, insulin is furnished free of charge to those unable to

TABLE V. DEATHS OF PATIENTS WHO HAD DIABETES IN OREGON, WASHINGTON, ONTARIO AND MINNESOTA

Author	Number of deaths	Insulin used, per cent	No insulin used, per cent	Insulin at final illness, per cent	Diet weighed or measured, per cent	Urine tested, per cent
Holcomb Oregon	112	54	41	33	25	37.5
Palmer Washington	226	68	32	53		
Defries and Ross Ontario	192	56	44	33		
Our cases Minnesota	375	63	34	50	39	49.5

buy it, yet it had not been used by 44 per cent of the 192 persons who died of diabetes, and only 12 per cent of these 192 persons had received it with any regularity for a period of time greater than a few months. In a similar series of diabetic deaths in Oregon, insulin had not been used in 41 per cent of the cases in the series, and in only 15 per cent had it been used with any regularity. In the same state only 38 per cent of those who died of diabetes had learned how to test the urine, and only 25 per cent how to plan their diets. The figures obtained in Washington are essentially the same as those in Minnesota.

Summary and Conclusions

These observations prompt the following conclusions:

In Minnesota, 28 per cent of deaths from diabetes are attributable to uncomplicated diabetic coma. These are preventable deaths, and indicate failure to make use of the methods available for the effective care of this disorder.

The Emergency Relief Administration has undertaken to provide insulin to very poor people on the relief lists who suffer from diabetes. This overcomes temporarily one of the difficulties existing in the year covered by my survey (1931). However, the experience in Ontario indicates that the provision of free insulin will not alone solve the problem. What is more necessary is a wider dissemination of knowledge. We have seen what education has done in helping to eliminate tuberculosis. We can expect to accomplish the same for diabetes. Just as was necessary in the tuberculosis campaign, the educational program must reach not only the physician but the public, and more particularly the patient and his family.

Deaths from coma, unnecessary deaths, can be prevented; that was demonstrated by the German city of Stettin. If this is accomplished, an accompanying benefit will be noted in the health of the living. If in Minnesota almost 200 persons with diabetes die each year unnecessarily, as has been shown, it is clear that many more are incapacitated unnecessarily. The experience of special clinics indicates clearly that a large number of these patients are disabled by their disease. If they are using insulin, they are using it improperly and not deriving full advantage from it. The criterion of successful treatment of diabetes is a normal state of physical and mental vigor. This result is obtainable in most cases, although it is not obtained in many cases today.

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DIABETIC DEATHS IN DULUTH: A STATISTICAL STUDY*

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VITAL statistics of life insurance companies and of the larger municipalities are showing a steady rise in the death rate from diabetes. Drolet[1] reported that in New York City the standardized death rate from diabetes has risen from 17.3 per 100,000 in 1901 to 27.9 per 100,000 inhabitants in 1931 or a true rise of 58 per cent. He stated that the introduction of insulin in 1922 was accompanied by a slight recession in mortality but this has since been lost. De Takats[2] quoted Wilder as having stated that the death rate from diabetes is actually mounting throughout the entire country. This rise is explained on the basis of improper use of insulin or no use of it. The Report of the Committee on Diabetes, delivered by Wilder,[3] at the meeting of the Minnesota State Medical Association in May, 1933, gave the mortality from diabetes for Minnesota per 100,000 population as 22.37 in 1932. For the five-year interval, 1915 to 1919, inclusive, it was 15.8 per 100,000. Wilder showed that the situation in Minnesota was no worse than elsewhere. He attributed the condition to ignorance or indifference on the part of the patient, inability to secure insulin and lack of knowledge about the treatment of diabetes on the part of physicians.

In an effort to study this situation in a small territory, the deaths from diabetes in the city of Duluth were studied. This was done in the city at large and then in two of the larger Duluth hospitals (St. Luke's and St. Mary's). Unfortunately the classified deaths in the city of Duluth were only available for the last three years. The method of classifying deaths followed by the City Health Department is that of the Manual of International List of Causes of Death. This classification is not satisfactory when an attempt is made to distinguish the number of deaths from coma from the entire group of deaths from diabetes. In many other respects the figures are not suitable for statistical study.

TABLE I. DIABETIC DEATHS IN THE CITY OF DULUTH

	Age, years															
	Less than 15	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	Total
1930					2	1	1	1	2	3	2	4		1	1	18
1931					1				3	2	2	3	3	2	2	18
1932		1		1				1	1	3	5	3	3	3	2	23

Table I gives the data for the years 1930, 1931, and 1932. The total deaths from diabetes for 1932 showed a marked increase over those for 1930 and 1931. If we are to assume, and rightfully so, that all these deaths which occur in persons who are less than fifty years of age are practically all deaths from coma, we see that this malady is ever with us and diabetics are still dying from this preventable condition. As this paper will show later, immunity to coma does not develop with old age. Therefore, we can also assume that coma is responsible for a large share of the deaths of persons in the older age group.

*Study carried out in Duluth by Dr. Elmer C. Bartels, formerly of the Arrowhead Clinic, Duluth, and Dr. Benjamin Blum, formerly resident at St. Luke's Hospital, Duluth.

Hospital Study

We were able to collect ninety cases in which diabetes was either the primary (coma) or associate cause of death. Forty-seven of these cases were taken from the records of St. Mary's Hospital and forty-three from St. Luke's Hospital. A careful classification of these cases was made, and the deaths due primarily to coma, of which there were twenty-four, were analyzed rigidly. In sixty-six cases diseases other than the associated diabetes were sufficient in themselves to have caused death. Fifty-nine patients in the entire group were females and thirty-one were males. This predominance of females is in

TABLE II. AGE INCIDENCE IN THE ENTIRE GROUP AND IN THE GROUP WITH DIABETIC COMA

	Age, years									Total	Per cent
	1–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89		
Entire group	1	6	6	3	13	16	26	18	1	90	
Diabetic coma	1	5		3	4	5	4	2		24	26

accord with the New York Statistics. The average age at death for the entire group was fifty-four years; the age at death ranged from seven to eighty years. For the group in which death was due to diabetic coma, the age at death averaged forty-two years, and ranged from seven to seventy-three years. Most interesting in Table II is the relatively large number of deaths from diabetic coma in the fifth and sixth decades of life. This rise in number of deaths from coma was expected in the earlier decades but the deaths in the later decades was most astounding and not in accord with the unfounded impression that diabetes in an old individual is always mild. This misconception has been stressed by Patmos, Bartels, and Adams.[4] Of the entire group of diabetic deaths 26 per cent died in coma.

The deaths from coma by years are shown in Table III. Apparently after the introduction of insulin, it was used with striking results as shown by the few deaths in 1925 and 1926. From 1926 there was an increase to the peak year of 1929 and since then a few each year. Can this be explained on the basis of overconfidence in the use of insulin? Prior to the introduction of insulin diet was the basis of treatment of diabetes. With the introduction of insulin used in conjunction with dietetic management, there was a marked reduction in the incidence of deaths due to coma. Then it was felt that insulin could take the place

TABLE III. DEATHS FROM 1925 TO 1933

	1925	1926	1927	1928	1929	1930	1931	1932	To July 1933
Entire group	3	11	13	10	15	10	8	15	5
Cases of diabetic coma	1	2	4	4	5	3	2	2	1

of the basic part of the treatment, namely, the diet, and subsequently a rise in deaths from coma took place. Most physicians who are successful in managing large groups of diabetic patients still feel that a fixed diet represents the foundation of the treatment of diabetes and that insulin is still of secondary importance. We are likely to have a false security in the use of insulin. That insulin represents only one part of the treatment of diabetic coma will be discussed later in the paper.

TABLE IV. DEATHS FROM DISEASES OTHER THAN THE ASSOCIATED DIABETES

Cardiovascular disease		33
Cardiac disease	15	
Cerebral disease	8	
Gangrene of feet and legs	9	
Pulmonary embolism	1	
Infection		18
Pneumonia	6	
Septicemia	5	
Pyelonephritis	2	
Parotitis	1	
Abscess of the lung	2	
Pericarditis with effusion	1	
Sinusitis with associated condition	1	
Tuberculosis		6
Miscellaneous conditions		9
Operation on gallbladder	1	
Multiple myeloma	1	
Ruptured liver	1	
Acute abdomen (type ?)	1	
Carcinoma of stomach	1	
Carcinoma of pancreas	1	
Obstructive jaundice (type not determined)	1	
Cause of death undetermined	1	
Senility	1	

A correlation was made of the causes of death in the group in which death was not due to diabetic coma (Table IV). Deaths from cardiovascular disease lead the group. Nathanson[5] has

pointed out the marked prevalence of arteriosclerosis in diabetics who are more than fifty years of age. This, of course, accounts for the occurrence of gangrene and to some degree for cerebral and cardiac lesions. Infections of all types were second in order of causes of death in our series. Moen and Reimann[6] have shown experimentally that there is a diminution of agglutinin response in uncontrolled diabetes. This apparently accounts for lowered resistance of patients with uncontrolled diabetes to infection. Patients with well controlled diabetes do not have this diminution in agglutinin response, therefore, strict control of diabetes at all times is necessary. Tuberculosis was the cause of death in six cases. This appears to be a relatively high incidence. Kramer and Lawson,[7] in their recent review of the incidence of tuberculosis in diabetics, stated that in their experience tuberculosis does not occur any more frequently in diabetics than in nondiabetics. Also in those cases of diabetes in which tuberculosis has developed, its course was not more unfavorable than in cases in which diabetes was not present, if the diabetes was under control. The miscellaneous conditions (Table IV) were only added for completeness and do not show any significant relationship.

Diabetic Coma

We were anxious to make a searching survey of the twenty-four cases in which death was due primarily to diabetic coma. We attempted to ascertain the cause, if possible, of these appalling and preventable deaths. Certain definite conclusions were permissible from the following data:

Duration of diabetes.—In fifteen cases we were able to obtain the duration of diabetes. It averaged forty-two months, and ranged from three months to ten years. In four cases, the duration was unknown and in five the diagnosis of diabetes was made after the patient's admission to the hospital in coma.

Previous attacks of coma.—Four patients, aged seven, thirteen, seventeen, and eighteen years, had had previous attacks of coma. The child, aged seven years, had weathered three attacks of coma only to succumb in the fourth. Our figures suggest that young individuals endure one or more attacks of coma but in the older age groups coma represents an extremely serious matter and carries a high mortality.

Factors precipitating coma.—Table V shows the conditions, if any, which apparently precipitated the onset of coma. In nine cases mismanagement of the diabetes caused the onset as infection was not present. In all of the other

TABLE V. FACTORS PRECIPITATING COMA

	Cases
None	9
Infection of the upper respiratory tract	5
Pneumonia (mild)	1
Pyelocystitis	2
Gangrene of foot	2
Ulcer of leg	1
Cellulitis of the leg	1
Suppuration of the knee	1
Erysipelas of the face	1
Infection of the finger	1

cases a definite sepsis was present, which in most cases was relatively mild and not fatal in itself, but most hazardous in causing coma. Of course, if the patient had been properly trained in the treatment of diabetes during these emergencies, coma in a fairly large percentage of cases could have been prevented. Prevention of coma should be the byword of all diabetic patients. Of course five patients were unaware of the presence of diabetes before hospitalization.

Dietetic management before coma.—The nineteen cases in which diabetes was diagnosed before the onset of coma were studied from the

TABLE VI. DIETETIC TREATMENT PRIOR TO COMA (NINETEEN CASES)

	Cases
Known diets	
1. Adequate	
C*40, P 50, F 175 (Patient went off diet recently)	
C 70, P 50, F 145 (Patient changed to Q.R.** diet)	
2. Inadequate diets	
C 35, P 45, F 100 (Farmer aged 31 years)	
C 98, P 65, F 106 (Girl aged 17 years)	
C 50, P 50, F 65 (Patient was unable to follow diet)	
C 45, P 36, F 70 (Patient became careless)	
1600 calories (Girl aged 18 years)	
No history obtained regarding diet	4
On diet but type unknown	3
Abandoned diet	
Six months prior to coma	1
When upper respiratory infection began	1
Never placed on a diet after diagnosis	1
Miscellaneous	
On diet but never controlled	1
On a "poor diet"	1

**—Qualitative Restriction.
*C—Carbohydrate
P—Protein
F—Fat

standpoint of previous dietetic management. In seven cases (Table VI) we were able to obtain the exact diet by previous hospital admissions

and diet slips. Only two of the seven patients were on an adequate diet and they had abandoned the diet shortly before the onset of coma. Five of the seven patients were on diets which were extremely inadequate, as is shown by the low caloric content. Because of the low caloric and satiety value a patient could not be expected to remain on such a diet for any period of time. Two patients abandoned their diet, one, six months prior to the onset of coma and one patient when a cold began. One patient was never placed on a diet because she was told that her diabetes was mild. Of two other patients of a miscellaneous group, one was on a diet but the diabetes was not controlled, and the other was on a "poor diet" as stated by the relatives. Apparently poor dietary management was an important factor in the etiology of coma.

Treatment with insulin before coma.—Of the nineteen patients with known diabetes before the onset of coma, six (31 per cent) were definitely known never to have used insulin. In five cases no definite statement was obtained as to whether the patient had taken insulin or not. The eight patients who took insulin rarely used it accurately. From our data on the usual régime in diet, it was inconceivable that insulin would be used with any greater care, and this was borne out in the study. One patient took 8 units three times a day and always had sugar in the urine. Two patients took 10 units three times a day. One patient who used 10 units three times a day had abandoned its use four months before the onset of coma. One patient used 20 units three times a day. One patient stopped the use of insulin when a cold began, which precipitated coma. One patient used three or four bottles of insulin a week while on a qualitative restriction diet. One patient used varying amounts.

De Takats and Fenn[2] stated that in Ontario where insulin is provided free of charge to charity patients none had been used in 44 per cent of 192 fatal cases of diabetes and in only 12.5 per cent had it been used with any regularity. In Illinois insulin had been used regularly in only 15 per cent of the fatal cases.

Onset of coma.—Nineteen patients were admitted to the hospital in coma, in ten of whom the duration of the coma before admission was known. It varied from a few hours to fifty hours as follows: in four cases between one and ten hours; in two cases between ten and twenty hours; in one case between twenty and thirty hours; in one case between thirty and forty hours; in two cases between forty and fifty hours. Five patients went into coma in the hospital while under observation for diabetic or surgical conditions. Of these, one patient was admitted because of a traumatic ulcer of the leg which was treated without appreciation of the diabetic condition. After coma developed the condition was recognized, but in spite of treatment death occurred five hours later. One patient was admitted for a mild diabetic acidosis; coma developed rapidly and death occurred three and a half hours later. In this case the acidosis was not promptly treated on admission to the hospital. One patient went into coma three days after admission for observation for a supposedly mild diabetic acidosis, and died forty-eight hours later in spite of vigorous treatment. One patient had been operated on for an acute appendicitis before a mild diabetic acidosis was controlled. She lapsed into coma shortly after operation and died fifty-nine hours later. One patient went into coma six days after admission for a mild acidosis. In this case the physician stated that "the patient couldn't tolerate insulin so it could not be used." This patient had vigorous intravenous medication with soda bicarbonote without avail. Although it might be surmised that seeing a patient shortly after the onset of coma is essential for good results, it is also true that once a patient is in coma the condition is extremely serious. This can be shown by the deaths that followed the onset of coma in the hospital. It follows logically, therefore, that the most important part of the treatment of diabetic coma is prophylaxis.

Treatment.—Immediate treatment of the coma was instituted in only a small number of cases on admission to the hospital in this series. Only six patients received immediate care. The time elapsing before treatment was begun after admission was variable in thirteen cases. In five cases one hour, in one case one and a half hour, in one three hours, in two cases three and a half hours, in one case five hours, in two cases nine hours, and in one case fifteen hours elapsed before treatment was begun. The necessity for prompt treatment cannot be stressed too strongly. Every minute lost decreases the chance of recovery.

Administration of insulin was the basis of

treatment in twenty-two cases. The amount given during coma varied from 50 units in five cases to as high as 930 units in one case. Between these two extremes six patients received between 50 and 100 units; two, between 100 and 150 units; two, between 150 and 200 units; two, between 200 and 300 units, three, between 300 and 400 units; and one patient between 400 and 500 units. The average amount given in twenty-two cases was 177 units. If insulin is the most important factor in the treatment of diabetic coma most of these patients should have survived, as almost all received substantial doses.

TABLE VII. BLOOD SUGAR STUDIES

Grams per 100 c.c. of blood	
On admission	Terminal
750	333
685	
660	125
555	
513	
504	
500	272
500	200
450	
429	110
416	
402	96
400	
375	
368	
300	250
300	
300	
166*	
Average 451	197

*Patient had received 80 units of insulin before admission.

That this is not true must be accepted from this study and can be shown from the studies on blood sugar (Table VII). Of the entire group in which blood sugars were taken before and after treatment with insulin, there was, in most cases, a drop in blood sugar to a point within favorable range. In the case of a child, aged seven years, who was admitted to the hospital in profound coma with a blood sugar of 166 gm. in 100 c.c. of blood, 80 units of insulin had been given before admission. Apparently blood sugar is only one feature in a case of diabetic coma and the sugar response has little bearing on the ultimate outcome.

A probable error in the treatment of these cases was failure to restore body fluids and counteract the concentration of the blood, thereby preventing circulatory collapse, which is responsible in a large part for death in diabetic coma. Intravenous administration of glucose was used in eleven cases, hypodermoclysis in ten cases, proctoclysis in seven cases and in some of these cases combinations of fluids were administered. Lande[8] has stated that "the degree of dehydration appears to be more unfavorable prognostically than either the degree or duration of coma." He attempted, however, to show that in the late stages of coma administration of fluids is occasionally of no advantage because of the existing capillary damage.

Summary and Conclusions

1. There is a dire necessity for better control of patients with diabetes. Mild as well as severe cases need to be under continued control. Coma prophylaxis should be paramount.

2. Patients must have better training in regard to dietary and insulin management. They must have sufficient knowledge to handle their condition during emergencies, such as sickness.

3. Infections, no matter how mild, may rapidly lead to coma. Preoperative control of diabetes is necessary as an uncontrolled case carries a high risk.

4. In all old patients with diabetes, no matter how mild their condition may seem, coma may develop. Older diabetics tolerate coma poorly.

5. Every case of diabetic coma requires emergency treatment of the most sincere and energetic type. Close clinical and laboratory observations are essential.

6. We are likely to have a false security with the use of insulin in the treatment of coma. Insulin represents only one phase in the treatment of diabetic coma as was shown by the relatively low blood sugars at the time of death in a number of cases.

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SURGERY IN DIABETES*

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Little more than a decade ago, as Joslin tells us, "there were few diabetic patients and their life was short and firmly bound with chains of acidosis and under-nutrition. Today there are many diabetics because they live longer and insulin has set them free." He estimated that every third person who had diabetes and probably "every other diabetic at some time during the course of his disease needs the surgeon and will seek him not in vain, provided he secures the coöperation of accurate and interested technicians, faithful nurses, and doctors conversant with diabetes."

Operating on patients with this disease formerly involved a hazard which few surgeons were willing to accept. The rates of mortality encountered varied from 18 to 46 per cent, and although this was due in some degree to operating mostly for emergencies as a measure of last resort, it was largely attributable to the lack of effective means for preventing the development of acidosis. The hazard in these cases is still serious but may be overcome by employing skillful surgery, the best possible anesthesia, and modern methods of controlling acidosis. Trauma to tissue, shock from loss of blood, and prolonged anesthesia are poorly borne especially in diabetes; neglect of these patients before and after operation often leads to dangerous acidosis. The attendance of physicians and nurses who possess special experience in diabetes is desirable, and closest coöperation between surgeon and physician is imperative. Every case in which operation must be performed in the presence of diabetes is a potential case of coma and should be treated accordingly.

*From the Divisions of Surgery and Medicine and Section on Orthopedic Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the Ramsey County Medical Society, St. Paul, Minnesota, December 18, 1933.

Necessary Medical Attention

In the presence of surgical emergencies nothing is to be gained by delaying operation; indeed, when a curable infection exists, delay may be actually harmful. This applies especially to amputations of the extremities for rapidly spreading gangrene with infection and to acute appendicitis, pelvic abscesses, mastoiditis, and other inflammatory processes. Acute infection favors the development of resistance to insulin and its removal is therefore the primary consideration A single subcutaneous injection of 20 to 30 units of insulin should be made, together with injection by vein of 1,000 c.c. of physiologic saline solution; the operation is then performed without further hesitation. On the other hand, when a surgical lesion is not infected, or when an existing infection is chronic, and has little or no influence on metabolism, there is no such excuse for haste, and time should be taken to secure the most favorable conditions before operating. The aims are complete freedom from acidosis, a sugar-free urine, and adequate reserves of glycogen, fluids, and salts. When the diabetes is uncontrolled and complicated by acidosis, marked dehydration results and this, in turn, adds to the risks of surgical shock. Water is lost in the course of operations on patients who do not have diabetes, especially when general anesthesia is used. Neuburgh computed the amount of water lost to be as much as 6 to 7 liters and attributed much postoperative shock to the resulting deficiency of fluid.

Attention Before Operation

The routine procedure at The Mayo Clinic has been as follows: The patient is observed in the hospital for two or more days while a measured diet is prescribed and sufficient insulin is used to clear the urine of sugar and to free it of ketone bodies. The diet for these patients is made somewhat richer in carbohydrate to provide extra glucose for storage as glycogen, but we have not found it necessary to resort to very high allowances of carbohydrate such as have been recommended by various clinics. None of our preoperative diets have contained more than 170 gm. of carbohydrate. If dehydration is apparent, fluids are given by rectum or by vein. On the morning of operation both breakfast and insulin are withheld. Occasionally a small dose of insulin is injected before the patient goes to the operating room; usually this is not given.

The Anesthesia and Operation

The choice of the anesthetic depends on the surgical indications. General anesthetics are poorly borne in diabetes. They produce some degree of hyperglycemia and acidosis in normal persons, and postoperative vomiting and unavoidable starvation intensify this. The order of choice of the anesthetic methods and agents available is as follows: local, spinal, nitrous oxide and oxygen, ethylene and oxygen, and ether. However, when ether can be expected to provide better relaxation and therefore to expedite and shorten time of operation or to reduce the degree of surgical trauma, it may be preferred (Table 1). In some clinics an intravenous injection of insulin and glucose is given during the course of operation. We have not found this necessary. The most important single factor is that the surgical procedure should be carried to completion with accuracy and celerity. A minimum of trauma and a minimum of anesthetic time are crucial.

TABLE 1

ANESTHETICS USED IN OPERATIONS ON DIABETIC PATIENTS—1930

Type	Cases	Per cent
Local and regional	109	43.25
Local and gas*	15	5.95
Local, gas and ether	4	1.59
Spinal	35	13.39
Spinal and gas	18	7.14
Spinal, gas and ether	4	1.59
Gas (nitrous oxide and ethylene)	14	5.56
Ether and gas	47	18.65
Ether	5	1.98
Ether, gas and sodium isoamyl-ethyl barbiturate	1	0.39
No anesthetic	38	13.10
Summary		
Local used in	128	50.79
Spinal used in	57	22.61
Gas used in	103	40.87
Ether used in	61	24.20

*Throughout this table gas means nitrous oxide and ethylene, alone or together with oxygen.

Attention After Operation

As soon as the patient has returned to his bed he is treated with insulin and injections of fluid. Saline solutions are preferred to solutions of glucose, because glucose, given parenterally, escapes the glycogen barrier of the liver and is in part excreted in the urine. This vitiates urinalysis as the gauge to the amount of insulin needed. Sugar is usually in high concentration in the blood of the diabetic patient, and for a time at least it seems unnecessary to provide additional sugar. The dose of insulin must be judged at first from periodic determinations of blood sugar. Later, when excretion of urine begins, each specimen of urine, as it is voided, is immediately analyzed for sugar, and these analyses enable a reasonably accurate appraisal of the demand for insulin. It is well to remember that the time of action of insulin is shortened by anesthesia, infection, and surgical trauma, and that the intervals between injections must be shortened. At least one injection every six hours is required, but no absolute rule about this is safe. Oral feeding is started as early as possible, usually after twenty-four hours. At first fruit juices alone are given, or ginger ale, or 10 per cent solutions of glucose. Later a more liberal diet is gradually resumed.

The danger of overdosing with insulin should be constantly in mind. We attribute one of our fatalities to insulin shock. The patient went into shock four hours after operation, and, although he was restored to consciousness, fatal bronchial pneumonia developed and may have been precipitated by the period of apnea that accompanied the severe insulin reaction. The physician in charge of these patients must be trained to

recognize quickly any evidence of metabolic abnormality. Acidosis threatens on the one hand, hypoglycemia from over use of insulin on the other. It is probably safer to err on the side of too little control than too much, at least for the first day or two after operation, and until the patient can begin to coöperate effectively. Slight glycosuria will do little harm; an attack of insulin coma has much more serious consequences.

TABLE 2

MORTALITY OF OPERATIONS IN DIABETES

	Registrations	Operations		Total	Deaths	Mortality per cent
		Major	Minor			
Oct. 1, 1921, to Oct. 1, 1925*	2095	304	363	667	20	3.0
1926	702	99	115	214	4	1.8
1927	765	91	104	195	11	5.6
1928	709	79	72	151	7	4.7
1929	782	103	72	175	5	2.9
1930	840	136	152	288	5	1.7
1931	782	109	108	217	6	2.8
1932	634	107	72	179	11	6.0
	7309	1028	1058	2086†	69‡	3.3

*Previously reported.
†28.5 per cent of all registrations.
‡Includes all deaths following amputations for gangrene.

Surgical Statistics

By adhering to the principles recounted it has been possible for us to hold the mortality of operations on diabetic patients at a rate that compares favorably to that obtained in The Mayo Clinic when operating on patients of comparable age who have diseases of comparable seriousness, but not complicated by diabetes. It must be remembered that more than 60 per cent of diabetic patients who present themselves for treatment are fifty years of age or more, and that age affects operative hazard more unfavorably than any other single factor. Judd, Wilder and Adams previously reported the operations on diabetic patients for the period of October 1, 1921, to October 1, 1925. There were, in that period, 304 major and 363 minor surgical procedures, or a total of 667 operations with twenty deaths. The mortality rate was 3 per cent. A review of the operations for the seven years from 1926 to 1932, inclusive, indicates that this record has been very nearly maintained over a much longer period. The grand total of the two series makes 2,086 operations, 1,028 major and 1,058 minor surgical procedures. The deaths number sixty-nine, a mortality rate of 3.3 per cent (Table 2).

The classification of the operations of this series into major and minor groups is in accordance with the procedure of The Mayo Clinic for classification of all operations. Multiple procedures on separate dates are counted as separate operations; multiple procedures on the same date are counted as one operation and listed under the principal procedure. This means that many

TABLE 3

OPERATIONS ON DIABETIC PATIENTS, 1932: NUMBER OF PATIENTS 140

Region of operation	Major	Minor	Total	Deaths
Brain	3	2	5	
Spinal cord	1		1	
Eye, cataract	10		10	
Eye, other	1	2	3	
Ear	1		1	1
Nose		1	1	
Throat, tonsils		4	4	
Throat, other				
Face, lips, tongue		4	4	
Teeth		14	14	
Skin, carbuncle	1	1	2	
Skin, other		3	3	
Neck, goiter	19		19	
Neck, other	2	3	5	2
Breast	3		3	
Thorax	1	1	2	
Esophagus, stomach, small intestine	4	3	7	1
Appendix	3		3	
Large intestine	5	1	6	
Rectum		4	4	
Gallbladder and bile ducts	10		10	2
Other abdominal operations	3		3	1
Hernia	1		1	
Kidney, ureter, suprarenal glands	1	1	2	
Urinary bladder	1	1	2	
Male genital organs, prostate gland	10		10	
Male genital organs, other	2	1	3	
Female genital organs	12	5	17	
Bones and joints	5	1	6	
Extremities	7	10	17	3
Paracentesis		1	1	
Transfusions		9	9	1
Miscellaneous	1		1	
Total	107	72	179	11

TABLE 4

DEATHS OF PATIENTS WITH DIABETES WHO UNDERWENT SURGICAL OPERATION, 1932

Case	Age, years	Grade of diabetes	Operation	Cause of death
1	66	4	1-25-32 amputation of left leg below knee; application of posterior splint	Gangrene of stump, amputation
2	65	3	2-24-32 partial gastrectomy; 2-25-32 transfusion; 2-27-32 transfusion	Carcinoma of stomach; pneumonia
3	72	Mild	3-14-32 transfusion; 3-17-32 cholecystoduodenostomy	Carcinoma of head of pancreas; bronchopneumonia
4	61	3	3-23-32 abdominal exploration	Hemorrhagic pancreatitis
5	58	4	3-30-32 complete mastoidectomy; 4-9-32 ablation of the left sigmoid sinus; 4-11-32 ligation of left internal jugular vein; 4-17-32 transfusion	Chronic otitis media and mastoiditis; bronchopneumonia
6	66	3	4-30-32 excision of gland, right posterior cervical region, for study	Infarction of left ventricle
7	61		5-9-32 embolectomy of right femoral artery	Coronary sclerosis with hypertension; embolic gangrene of legs
8	55	Latent	5-6-32 plastic operation of neck; actinodermatitis	Acute streptococcal sepsis
9	76	1	8-23-32 amputation of right leg; gangrene of right foot	Gas gangrene stump of right leg
10	60		9-9-32 cholecystectomy	Chronic cholecystitis; acute empyema; ileus graded 3; auricular fibrillation
11	46	4	9-16-32 transfusion; secondary anemia	Adreno-cortical syndrome

operations, listed as single operations, are in fact multiple operations.

The major operations include: the procedures in which a body cavity (pleura, peritoneum, joint, eyeball) is entered by a knife; operations on the thyroid gland, hernia and prostate gland; resection of a cataract and iridectomy; ventriculogram; open operation for fracture; manipulative reduction of fracture of hip, spine or pelvis; all amputations of arms, legs, hands, feet, fingers or toes, and incision of carbuncles.

The minor operations include: aspiration of all kinds; operation on the eye in which the eyeball is not entered; tonsillectomy and adenoidectomy; encephalogram; manipulative reduction of fractures of extremities; resections primarily done for purposes of biopsy; hemorrhoidectomy; endoscopy of all kinds, except transurethral prostatic resection; drainage of all abscesses except carbuncles; transfusions of blood, and treatment of varicose veins by multiple injections at separate dates (one minor operation).

Reapplication of casts, removal of drainage tubes, removal of sutures, other surgical dressing, and intravenous injection of fluids and drugs are not listed as operations.

A classification of operations performed in 1932 is shown in Table 3. Allan and Judd, Wilder and Adams, have published similar classifications for previous years. The severity of the diabetes in the series as a whole varied from mild to severe, with about half of all patients requiring insulin to make possible their adequate nutrition.

It should be emphasized that no patient, after October, 1923, has been refused the benefits of surgery on the ground of diabetes. Selection of patients for operation has been made on the basis of exactly the same indications as those followed for selection of patients who are not afflicted with diabetes.

The causes of death in the fatal cases of the series do not include diabetic coma. Severe diabetic acidosis has been avoided in every instance. The patients died from the type of postoperative complications met in all surgical prac-

tice (Table 4). An exception may be the case mentioned in the foregoing, in which an overdose of insulin precipitated apnea and was followed by fatal bronchial pneumonia. Among the sixty-nine deaths are the ten that followed amputation for diabetic gangrene.

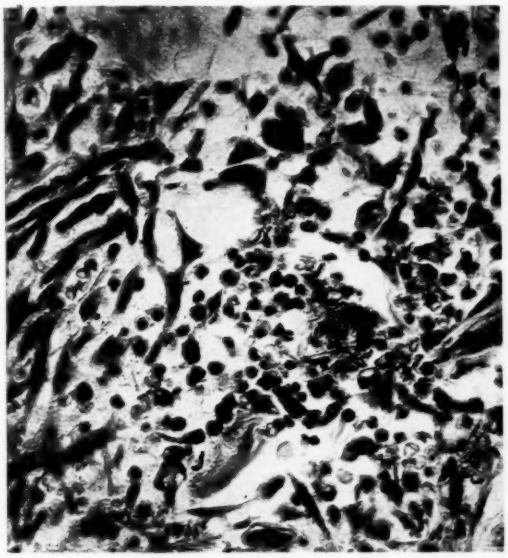


Fig. 1. Normal organism (experimental wound). Cellular exudate of clot between cut ends of dermis in wound three days old: clear-cut appearance of cells; transition forms of fibroblasts; moderate cellular infiltration; conservative deposition of polymorphonuclear neutrophilic leukocytes; fibrin forming the basis for the cellular infiltration; orderly arrangement of cells (x400). (Permission of R. J. Bennet, Jr.)

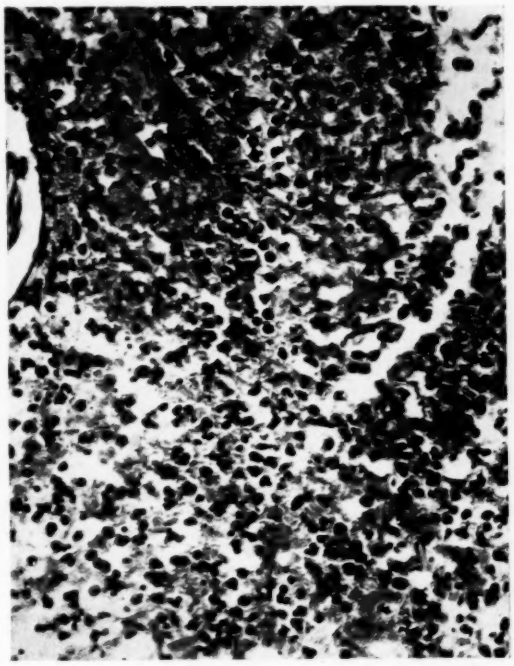


Fig. 2. Diabetic organism (experimental diabetes and experimental wound). Cellular exudate of clot between cut ends of dermis in wound three days old: hazy appearance of cells; no evidence of fibroblasts; massive cellular infiltration; marked predominance of polymorphonuclear neutrophilic leukocytes; disorderly cellular arrangement (x400). (Permission of R. J. Bennet, Jr.)

In the period of eleven years covered by this review, the diagnosis of diabetes occurs in 7,309 registrations. About a third of the patients concerned had registered more than once. This means that about 4,800 patients underwent about 2,100 operations, which bears out Joslin's estimate, already mentioned, that "probably every other diabetic at some time in the course of his disease needs the surgeon."

Healing of Wounds

The healing of surgical incisions is delayed when treatment of diabetes is inadequate; not otherwise. Bennett recently has completed the study of surgical wounds in dogs made diabetic by pancreatectomy. The pancreas was removed under ether anesthesia. The animals were supported with insulin and a suitable regimen until they had recovered completely. Then insulin was withheld, and when the ensuing diabetic state was developed, abdominal incisions were made under local anesthesia. As compared to the behavior in identical wounds, in healthy animals used as controls, the healing of these wounds was abnormal. The tissues were edematous, deposit of fibrin was delayed, and the amount of fibrin was restricted. The cellular reaction was excessive and the exuded cells appeared to be of the so-called "toxic" type. New blood vessels were slow to form, and more thrombosis than normal was noted in preformed vessels (Figs. 1 to 4). On the other hand, healing proceeded perfectly normally when the diabetes was well controlled. The delayed healing of the extremities of diabetic patients who have undergone amputations for gangrene is attributable to atherosclerotic obstruction to the peripheral circulation.

Gangrene

Allan and Kintner recently have reviewed our experience with the serious complication of

gangrene. Table 5 gives the essential data. The lesson to be drawn from it is obvious: Either operate early and operate high or treat the lesion medically and avoid all surgery. This old rule has guided us through the last decade to a mortality in diabetic gangrene that is comparatively very low. When we deviated from it, as we did occasionally, we had reason to regret it. Primary amputations through the foot for removal of gangrenous toes was performed in fifteen cases. Higher amputation was necessary in a third of these. The ultimate outcome was fatal in 20 per cent of cases. By contrast, in seventy-one cases of gangrene of the toes or foot, in which primary amputation was through the leg, a secondary operation was required in only four cases, and the ultimate outcome was fatal in only 7 per cent.

TABLE 5

CASES OF DIABETIC GANGRENE OF TOES AND FEET: 1922 TO 1931 INCLUSIVE

(data furnished by Allan and Kintner)

	Cases*	Successful	Deaths	Mortality, per cent
Treated medically	69	43	16	23
Treated surgically	86	74	8	11
Primary amputation below ankle (higher amputation later in 5)	15	7	3	20
Primary amputation above ankle (higher amputation later in 4)	71	62	5	7

*Necrosis of tissue of considerable degree in all these cases; infections not accompanied by massive decay of tissue; perforating ulcers and other sores not included.

Attempts to save feet by amputation of toes, by open drainage, and by other procedures unquestionably are hazardous. The fifteen cases chosen for such attempts were suitable by all ordinary criteria: the gangrene was limited to the toes, the pulsation of the dorsalis pedis and posterior tibial arteries was fair, the extremity was warm, and there was no great difference in blanching or reddening on elevating or lowering the leg. Yet the mortality rate in this group almost equals that observed in sixty-seven cases (Table 5) in which medical treatment alone was provided. Once amputation is decided on it should be done below the knee, provided pulsation is good in the popliteal artery; above the knee if pulsation is inadequate. A well-fitting artificial leg, or even a wooden peg, is to be considered an asset in the light of the danger of imperfect healing of wounds after amputation. These observations do not apply to perforating ulcers, other sores, and other chronic infections of the feet which are not accompanied by massive necrosis of tissue or obvious impairment of circulation. In such cases the leg usually can be saved. When infection is superimposed on arteriosclerosis, and if it is clearly advancing and reaches the ankle, high amputation is desirable and should be done without delay.

The medical care for infected extremities, with or without gangrene, is as follows: Absolute rest in bed is enforced; the foot is slightly elevated above the horizontal; glycosuria is rigidly controlled. A high renal threshold for glucose develops in many cases of diabetes of long duration, and under these circumstances the tissues may require a concentration of blood sugar that is higher than normal. Consequently it is not desirable to force the blood sugar lower than is necessary to avoid glycosuria.

If the gangrene is dry and not grossly infected, a dry dressing is used at the site of the lesion, but if infection is present, the old Ochsner dressing of gauze and cotton is used. These are made 1 inch thick and saturated with a mixture of equal parts of 50 per cent alcohol and saturated solution of boric acid. We have seldom considered it expedient to resort to multiple incisions for drainage of tracking abscesses, or to the Carrel-Dakin type of irrigation. The infection either starts to subside within twenty-four hours after starting the measures enumerated, or by this time gives clear evidence of advancing. If it subsides, the treatment is continued until it is fully controlled, and then the decision is made as to whether the degree of the accompanying gangrene or the degree of circulatory impairment justifies amputation. If the infection fails to subside after twenty-four hours of treatment with alcohol and boric acid, amputation is usually recommended. If the redness and swelling extend beyond the ankle, immediate amputation is urged.

Ulcers and Other Sores

Lesions of the feet that are not accompanied by gross impairment of circulation as a rule are

caused by infection. They include infected corns and calluses, perforating ulcers, osteomyelitis, burns, frost bite, varicose ulcers, and septic abrasions. Osteomyelitis of a phalanx should be suspected (McKittrick and Root) in every localized infection of more than two weeks' duration in any part of a toe or foot. The diagnosis is made roentgenologically or by encountering rough bone with the probe. The perforating ulcer, and indeed many of the indolent, infectious conditions of the feet in diabetes, may in part be dependent on the presence of peripheral neuritis. Almost always the feet are abnormally insensitive, and complaints of numbness and of aching pains at night are common. However, a factor that probably is of primary importance in most cases is a scanty blood supply. Woltman and Wilder have considered the principal reason for the neuritis of diabetes to be interference with the blood supply of the nerves. Often much needless suffering results from unnecessary delay in the treatment of these infectious conditions. Diabetic patients should learn to treat all abrasions seriously, and immediately to apply a nonirritating antiseptic, such as the mixture of boric acid and alcohol. Prophylactic measures also are important: clean socks and well-fitting shoes.

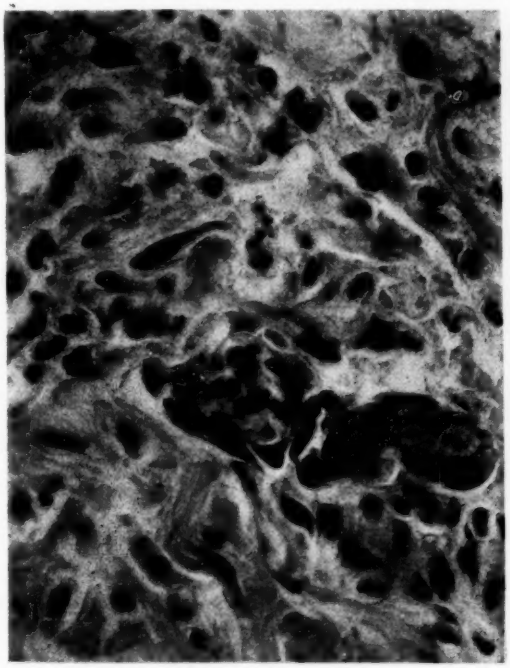


Fig. 3. Normal (experimental wound). Cellular infiltration of dermis in wound five days old; clear-cut appearance of cells; moderate polymorphonuclear netrophilic leukocytic infiltration; mononucleated cells are smaller in size and greater in numbers; the total cellular infiltration is less than in Figure 2; the dermis appears firmly arranged (x900). (Permission of R. J. Bennet, Jr.)

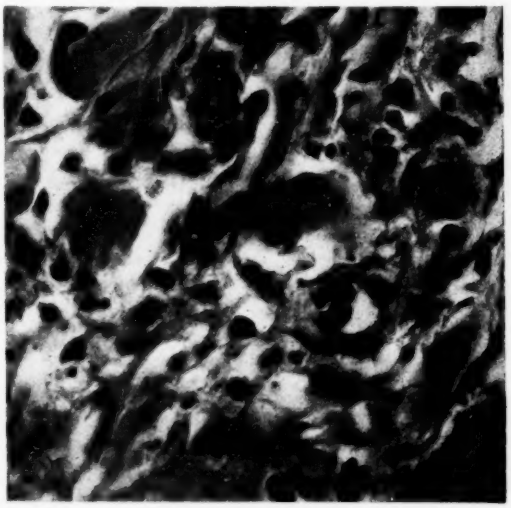
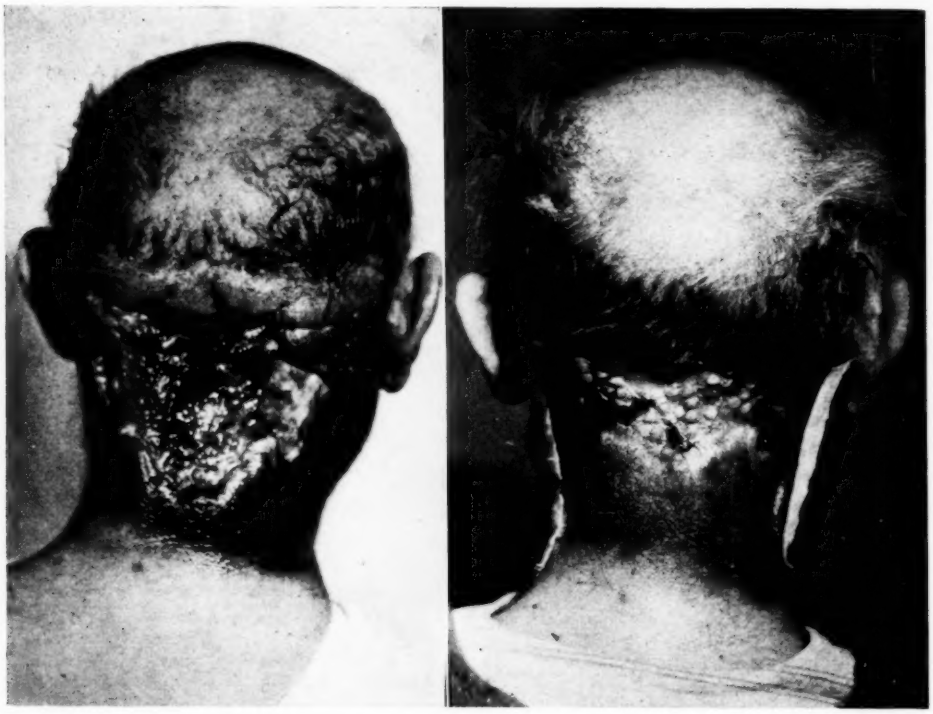


Fig. 4. Diabetic organism (experimental diabetes and experimental wound). Cellular infiltration of dermis in wound five days old: hazy appearance of the cells; predominating polymorphonuclear neutrophilic leukocytic infiltration; mononucleated cells are larger in size and smaller in numbers; total cellular infiltration more than in normal section; dermis appearing loosely arranged (x900). (Permission of R. J. Bennet, Jr.)

The treatment of the advanced lesion is essentially the same as the medical treatment described under gangrene. Thick calluses must be removed mechanically. It is possible in many cases to improve the peripheral blood flow by vasodilating drugs and thereby to hasten healing. Among such drugs, theobromine in doses of 10 to 15 grains (0.65 to 1 gm.) three times daily has proved effective, as has also pancreatic tissue extract. The treatment in these cases, and in cases of gangrene in which operation is declined, includes the use of therapeutic measures directed at the circulation: daily massage, contrast baths, and postural exercises of the Buerger type. It is important to remember that the skin of diabetic patients with arteriosclerosis will burn and blister at temperatures well below those which would not be injurious otherwise, and that any application of heat demands exercise of ex-

treme caution. The same caution is important in applying roentgen treatment to extremities of diabetic patients. We have seen two cases of diabetic necrosis of tissue which followed treatment elsewhere with doses of roentgen rays that were of average therapeutic magnitude. Exposures to sunlight or ultra-violet light also are beneficial, but caution to avoid burning is again necessary. A general rule that seems to have helped in our hospitals is that no hot water bags or other applications of heat are to be made below the knees of diabetic patients without the written order of the physician or surgeon who is responsible.



A B

Fig. 5. Carbuncle of a patient with diabetes. *A*, after control of infection, showing extensive destruction of skin; *B*, after healing. Pinch grafts were used.

Carbuncles

Carbuncle is a deadly complication in diabetes. The mortality rate is reported as from 25 to 60 per cent. Fortunately it occurs infrequently and is nearly always preventable by cleanliness and proper attention to the control of glycosuria. The cases we have seen have been those of obese patients who were uncleanly in their habits and who paid little or no attention to the treatment of their disease.

As Leddy and Morton have reported, roentgen rays may hasten localization in carbuncle and may lessen pain. The most important prophylactic measure is the admonition of Price on the subject of pimples and boils, "Don't squeeze, don't prick, don't cut." To this McKittrick and Root properly add, "Don't show sugar, and do respect an infection no matter how small it may be." A further wise admonition is to avoid the customary shaving of the neck at the barber shop. Boils are frequently due to infection from barbers' razors, and carbuncles may follow boils. It is wise for the diabetic patient to use a private razor. The wide crucial incision extending throughout the zone of induration seems a particularly bad form of treatment. It must lead to extension of infection and septicemia in many cases. It is fortunate that carbuncle occurs infrequently. McKittrick and Root reported only nineteen cases of it in four and a half years in the very large diabetic service at the Deaconess

Hospital. Our incidence is still smaller. We have had sixteen cases in eleven years. In many of these we have obtained good therapeutic results by injecting methenamine intravenously, and at the present time in cases of diabetes we are avoiding operation entirely. The essential items in our treatment are: (1) absolute rest in bed, (2) rigid control of glycosuria, (3) thick gauze and cotton dressing saturated with equal parts of boric acid and 50 per cent alcohol, kept hot, (4) daily intravenous injection of 40 per cent solution of methenamine for seven days. After central necrosis of the carbuncle has occurred and natural drainage has established itself, but not until then, a pair of sterile artery forceps is introduced and gently opened to hasten drainage. Occasionally the destruction of skin necessitates skin grafting, but this is not the rule (Fig. 5).

A discussion of the rationale of methenamine in septicemia and other infections is given by Buzello, de Takats and others. The dose we have used is large enough so that traces of formaldehyde can be demonstrated in pus taken from the center of the carbuncle. The growth of bacteria is probably inhibited by this trace of formaldehyde, and possibly also the natural defenses of the organism are stimulated by the drug.

Six of our sixteen diabetic patients with carbuncle did not receive methenamine and two of these died, both following wide crucial incision of the lesion. Ten of the patients received the injections, and among these there was only one fatality. This patient had had the infection for seventeen days before he came to us. He was then treated for eleven days with bacteriophage and typhoid vaccine, without benefit. Separate furuncles developed in other parts of the body. Blood cultures were positive on two separate days. Methenamine was given at this late date, and three days afterward a blood culture was negative and symptomatic improvement was noted. For unexplained reasons, injections of methenamine were discontinued, and five days afterward the patient died. Necropsy revealed suppurative nephritis and multiple subcutaneous and other abscesses in addition to the carbuncle.

We have used methenamine in other cases of sepsis with what appeared to be beneficial results. One patient with staphlococcal pyemia, multiple abscesses, and myelitis in the body of a vertebra, recovered from what we thought was a perfectly hopeless condition. The method deserves further trial, particularly since the drug is harmless in the dose recommended. Some hematuria may be seen after seven or eight days of injection, but this stops at once as soon as the daily injections are discontinued. The occurrence of ten successive cases of diabetic carbuncle, with only one death, is worthy of consideration.

Summary and Conclusions

1. A low (3.3 per cent) mortality rate in a series of 2,086 operations of all kinds on patients with diabetes (sixty-nine deaths and none of these from acidosis) is attributable to expeditious surgery, short anesthetic time and close medical supervision after operation.

2. The healing of wounds is delayed in uncontrolled diabetes but proceeds normally when glycosuria and acidosis are controlled.

3. Of 155 cases of diabetic gangrene of the lower extremities, in sixty-nine treatment was conservative, with a mortality rate of 23 per cent; in fifteen treatment was by amputation of toes, with a mortality rate of 20 per cent; in seventy-one treatment was by primary amputation of the leg, with a mortality rate of 7 per cent. The old dictum, "Either operate early and operate high or treat the lesion medically and avoid all surgery," must be adhered to if loss of life from gangrene is to be minimized.

4. Lesions of the feet not accompanied by massive necrosis of tissue or grossly impaired circulation are almost always amenable to medical treatment.

5. Carbuncle is usually accompanied by a mortality rate of from 25 to 60 per cent. In a short series of sixteen cases of diabetes with carbuncle, treatment in ten was by intravenous injections of methenamine and of the patients concerned one, who had received methenamine inadequately and very late, died. The other six patients received no methenamine; three of them were treated by radical incision of the carbuncle, and of these, two died. The rationale of the use of methenamine for this purpose is given.

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SPONTANEOUS HYPOGLYCEMIA

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EXTENSIVE work in the field of endocrinology during the last decade has resulted in the establishment of many new disease entities. There is probably no new entity more dramatic in its symptoms than that of spontaneous hyperinsulinism.

The close association of hyperinsulinism with its counter disease diabetes mellitus or hypoinsulinism makes it necessary to include both diseases in any historical résumé of this condition.

Diabetes mellitus was probably known to the ancients, as is evidenced by their description of polyuria in the Papyrus Ebers.[27] The first accurate description of diabetes, however, was given by Areteus the Cappadocian[1] sometime during the second century. Many other authors observed diabetes, but the first notable contribution to the disease came in 1679 when Thomas Willis[43] recognized that the urine of diabetic individuals was sweet in taste. From the time of Willis there was no increase in the knowledge of diabetes until Matthew Dobson[9] by a series of well planned experiments proved that sugar was present in the diabetic urine. Again, with the exception of minor contributions, nothing of importance was noted until the time of Oscar Minkowski. It was to be the lot of this observer to recognize that diabetes mellitus could be produced by the extirpation of the pancreas.[29] Then Opie, while working at Johns Hopkins University, called attention to the degenerative changes in the Islands of Langerhans of the diabetic pancreas.[31] The summation of the work of Opie and Minkowski led Sharpey-Schafer in 1916 to advance the hypothesis that some unknown substance of the islet cells was missing in diabetes mellitus. There was now left for the physiologist the problem of isolating this unknown substance. Moses Barron[4] noted that in obstruction to the pancreatic ducts there was no atrophy of the islet cells; and it was Banting who first realized the significance of this observation. Upon this observation Banting first built the method of isolating insulin. In 1922 Banting and Best[3] not only established the existence of insulin in the islet cells, but were also able to show its practical application in the treatment of diabetes mellitus. Thus was established the accuracy of Sharpey-Schafer's original hypothesis. Since this work was completed, diabetes mellitus may well be known as "hypoinsulinism." Events moved rapidly following the discovery of insulin and soon physicians became familiar with hypogly-

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cemic shock from overdosage of insulin. It remained, however, for the astute clinical observer Harris[17] to recognize that hypoglycemic reactions occurred in individuals not receiving insulin, and he suggested that this phenomenon might well be pancreatic in origin. The pathological proof of this suggestion was wanting until Wilder[40] and his associates by a most brilliant clinical and physiological observation definitely established the existence of pancreatic hyperinsulinism.

Since the report of Harris and Wilder, an increasing number of cases of spontaneous hyperinsulinism are appearing in literature; and today the disease is being recognized universally. It is the purpose of this paper to emphasize that in spontaneous hyperinsulinism other factors play as important a rôle in the production of this disease as does the pancreas itself.

Many names have been suggested for this new entity, the commonest of these being: spontaneous hyperinsulinism, spontaneous hypoglycemia, insulogenic hypoglycemia, pancreatic hypoglycemia, etc. No name so far suggested accurately describes the disease in toto.

Any definition of this disease must by necessity be lengthy and inclusive. It may be well defined as a specific disease characterized by vague attacks of neurological bearing that vary from mild sensations of uneasiness to grand mal seizures or even narcolepsy, with relief from these attacks occurring upon the administration of carbohydrate, the diagnosis clinically depending on a low blood sugar during the attacks, and caused anatomically by tumors or hypertrophy of the Islands of Langerhans; or other endocrine disorders.

Very little information exists concerning the influence of season, climate, altitude, etc., upon this disease. The ages of those suffering from the disease vary greatly, and there is no clinical or pathological evidence from the reports to suggest that this disease may be limited to any specific age group. The cases reported so far are too few in number to state the sex relationship, but to date it appears as though the disease occurs twice as frequently in men as in women. The disease has no predilection for specific occupations, nor is it associated with any hygienic factor.

Toxic factors, particularly those that produce liver damage, will precipitate and even be the etiological factors in producing spontaneous hypoglycemia. Evidence is accumulating that chronic alcoholism, cirrhosis of the liver, etc., may decrease the heptogenic glycogen storage function to such an extent as to produce hypoglycemia. Bizarre types of diet, particularly when they include excessive amounts of carbohydrate, may lead to hypoglycemic reactions. Diabetes also plays a role in the production of spontaneous hypoglycemia. This phenomenon is being looked upon as a dysinsulogenic process and will not be discussed in this paper. Trauma and infection play a role in the excitation of attacks as, also, do mental strain and worry.

The symptomatology of this disease is protean yet retains a number of basic phenomena that aid in the establishment of a diagnosis. In general the attacks resembles the insulin shock produced by an excessive dosage of insulin. The attacks are relieved by the ingestion of food. At the onset the attacks are mild in character and occur at wide intervals. As the disease remains untreated the attacks become increasingly severe and intervals shorter.

The attacks usually occur at varying intervals following meals or after fasting. At the onset, the patient becomes weak and nervous, the hands tremble and a sensation of hunger may appear. Almost by instinct the patient realizes that food will relieve the attack.

Occasionally visual disturbances appear with blurred vision and diplopia being common complaints. Nausea, vomiting and vertigo are frequently reported. Neurological complaints are present, particularly those suggesting epilepsy. In severe attacks the mental confusion becomes pronounced with the patient passing into mild states of stupor or into complete narcolepsy. Convulsions may be pronounced. The seizure seldom lasts long, except terminally, and the patient usually recovers spontaneously from the attack. Following the attack the patient may reveal a loss of memory for events that occurred during the interval of seizure. Sometimes residual neurological symptoms are present following the attack. In severe seizures the patient may have the sensation of dissolution. Often the presenting symptoms are strongly suggestive of epilepsy except that the attack is aborted by the administration of carbohydrate. When untreated, the disease usually increases in severity.

Physical examination during the intervals reveals no pathognomic sign of the disease. When

seen in the attack, the picture resembles either an insulin reaction or one of the epileptiform states.

The diagnosis is usually made by the presence of low blood sugar values. This is particularly true of fasting examinations. Blood sugar determinations taken every two hours while the patient is on his regular diet frequently reveal subnormal blood sugar values occurring at the time of seizure. Blood sugar determinations taken during the attack reveal low values. Occasionally the spinal fluid may have a low sugar value. Glucose tolerance curves give many types of reaction, but as yet their complete diagnostic significance is unknown. Other laboratory findings may be normal or reveal conditions of little significance. There may be, however, findings suggesting endocrine disturbance such as low basal rates, etc., that are of value in determining the etiology of the attacks.

An intelligent understanding of the disease necessitates a knowledge of carbohydrate metabolism as well as the realization that in spontaneous hyperinsulinism the disease is not necessarily pancreatic in origin but rather may be the expression of some other endocrine disturbance.

In general, the available carbohydrate to the body represents the ingested carbohydrate plus the carbohydrate moiety of the proteins as well as the carbohydrate component of fats. The carbohydrates are, in the most part, converted into glucose by the action of enzymes. The glucose thus formed is absorbed and carried to the liver by the portal circulation. The small amounts of galactose and levulose that are formed are also converted into dextrose (glucose) as an end-result of digestion. Likewise the available carbohydrates from the amino acids and fats are converted into dextrose.

When the glucose reaches the liver, it may be converted into glycogen by the action of specific enzymes, and this glycogen is stored in the liver. This process is known as glycogenesis. The liver is able to store approximately two hundred grams of glycogen, and it is this glycogen that represents the available source of carbohydrate reserve for the maintenance of the blood sugar. By the process of glycolysis small amounts of glucose are used in hepatic cell metabolism. Any excess of glucose passes directly into the general circulation where, by the process of glycogenesis or glycolysis, it is stored or utilized by the tissues.

The glycogen stored in the muscles represents the glucose requirement for tissue metabolism. The glucose used by the tissues differs from glucose of hepatic origin. It is necessary that the hepatic glucose again undergo the process of tissue glycogenesis. This phenomenon is probably influenced by insulin activity. The hepatic glycogen maintains the blood sugar level and is called upon to furnish glucose to the tissues upon depletion of the tissue glycogen reserve.

In general, the tissue glycogen concentration is depleted in proportion to the amount of tissue metabolic activity, and its restoration to normal depends upon the hepatic glycogen reserve. However, insulin is necessary for tissue glycogenesis and any factor altering the secretion or activity of insulin also indirectly alters the process of glycogenesis. Pituitrin is antagonistic to insulin in its action and is known to inhibit tissue glycogenesis.[5] Wilder[41] described a new syndrome of pituitary hypoglycemia which is characterized by hypoglycemic symptoms in association with pituitary disturbances. He also mentions several patients afflicted with pituitary tumors who in addition suffered from hypoglycemia. Lloyd[24] observed a patient with proven pituitary tumor who died in convulsions. Necropsy revealed, besides the tumor, hypertrophy of the Islands of Langerhans and of the parathyroids.

The hepatic glycogen reserve maintains the normal blood sugar concentration and any change in the hepatic glycogen reserve is dependent upon many extrahepatic factors. Hepatic glycogenolysis is increased when there is a fall in the blood sugar concentration, this mechanism being of a compensatory nature. Adrenalin influences the hepatic glycogen content in various ways: it causes a decrease in tissue glycogen content and inhibits glucose oxidation; in addition it increases all glycogenolytic processes with a resultant increase in blood sugar concentrations. Anderson[2] reports a case of fatal hypoglycemia in a patient dying of an adrenal tumor, while Longcope[25] was able to find hypoglycemia frequently in scleroderma. Further, Wadi[38] refers to the presence of hypoglycemia in Addison's disease.

Thyroxin in increased amounts makes the liver sensitive to nervous impulses and to adrenalin, which increases the rate of glycogen change into glucose. It is upon this basis that the fasting hyperglycemia of hyperthyroid individuals is best explained. In thyroid insufficiency the subject

of hypoglycemia is one of controversy. It has been observed by Sharpey-Schafer,[34] Campbell,[6] as well as Gardner-Hill, et al.,[14] that patients with myxedema, cretinism and other hypothyroid states have an increased carbohydrate tolerance as well as hypoglycemia in some instances. Apparently the degree of hypoglycemia under these circumstances is not marked and of little clinical importance.

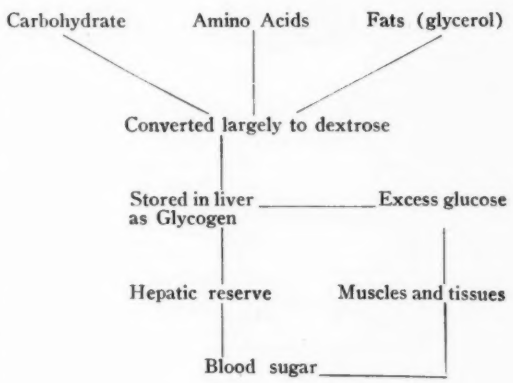
An increased hydrogen ion concentration brings about an increase in the glycogenolytic action with a hyperglycemia resulting because of it. Such is the nature of the hyperglycemia occurring with asphyxia.

Puncture or stimulation of the floor of the fourth ventricle sends nerve impulses to the liver and adrenals. These impulses by increasing the amount of adrenalin as well as by stimulation of the liver increase the blood sugar concentration. Severe or strenuous muscular activity produces a rise in blood sugar values largely through the influence of adrenalin. This in turn may be followed by a compensatory hypoglycemia. It is interesting to note that Scheimann[33] found two cases of hypoglycemia in progressive muscular dystrophy.

Inasmuch as the hepatic glycogen content varies with changes in the tissue glycogen content, it becomes apparent that any factor decreasing the utilization of tissue glucose will also alter the hepatic reserve and produce hyperglycemia. In diabetes, insulin is deficient, and since insulin is necessary for tissue glycogenesis it is obvious that hyperglycemia must result. Further, since pituitrin is the antagonist of insulin, it follows that patients suffering from hyperpituitary states will show evidence of hyperglycemia.

Hypoglycemia may result from a decreased rate of hepatic glycogenesis or by increased tissue glycogenesis or tissue glucose utilization. It is known that hypothyroidism and hypoadrenalinism are often associated with low blood sugar values. Since the liver acts as the reserve medium for glycogen, any factor that alters liver function, thus diminishing or preventing hepatic efficiency, will produce hypoglycemia. Late stages of hepatic cirrhosis often show low blood sugar values. Diabetics will at times show hypoglycemia because of a sudden depletion of the hepatic reserve. Occasionally patients suffering from diabetes and cirrhosis of the liver will show an increased carbohydrate tolerance as the cirrhotic process becomes severe. Toxic factors producing liver damage may also deplete the hepatic reserve. Mann[28] has established the relationship of the liver to glucose storage. Le Count, et al.,[23] feel that the glycogen storing capacity of the liver may be impaired in alcoholics because of fatty infiltration. They also suggest that "whiskey fits" may be due to hypoglycemia. Nadler and Wolfer[30] report hypoglycemia in a patient dying of carcinoma of the liver, while Josephs,[21] Griffith,[16] Snapper and Van Creveld,[36] as well as Wagner and Parnass[39] found hypoglycemia in association with various hepatic changes. Elliot[11] reports the presence of hypoglycemia in primary carcinoma of the liver.

CHART I. SOURCE OF CARBOHYDRATE



Blood Sugar decreased by:	Blood Sugar increased by:
Hypothyroidism	Hyperthyroidism
Hypoadrenalinism	Hyperadrenalinism
Hyperinsulinism	Hypoinsulinism
Pituitary dysfunction	Hydrogen ion increase
Pluriglandular syndromes	Acidoses
Muscular dystrophy	Hyperpituitarism
	Asphyxia

Changes in tissue glycogenesis may result from spontaneous increase in insulin secretion. In certain tumors having their origin in the islet cells of the pancreas there is an increase in insulin formation with resulting hypoglycemia.[31,32,33,34] There is also a spontaneous increased insulin secretion from apparently normal islet cells that also lowers the blood sugar concentration.[12,42] A compensatory hypoglycemia often follows intermittent hyperglycemia phenomena. This is seen in excessive carbohydrate

ingestion or increased adrenal secretion; following the primary rise in the blood sugar an overstimulation of the islet cells results in an excessive insulin formation producing a compensatory hypoglycemia. John[19] was the first to suggest the overfunction of the insulogenic apparatus to increased carbohydrate intake; and Winons[44] suggests that an excessive carbohydrate intake was an important factor in one of his cases of hyperinsulinism.

In hypopituitarism, there is a disturbance in the pituitrin-insulin balance that results in a hypoglycemic state.[24,41]

It is obvious that hypoglycemia may result from numerous factors other than the primary pancreatic factor. The success in therapy depends on the recognition of the cause of the hypoglycemia. Chart I outlines briefly the factors influencing carbohydrate metabolism.

The following three cases are illustrative of the various etiological factors producing hypoglycemia.

Case Reports

Case 1.—W. F., a white male pharmacist, twenty-nine years of age, came under observation on October 7, 1932, because of an "impelling desire to sleep."

In June of 1932 he developed an upper respiratory infection that persisted for two weeks. He recovered his health, but noticed that any exertion would bring about a feeling of exhaustion. In August he noticed that this feeling of exhaustion was now present at the time of awaking from sleep and would then recur in the middle of the morning. This feeling was aborted by taking a nap of ten to fifteen minutes. In the latter part of August the feeling of fatigue and faintness began to occur just before meals and the sensations would disappear as soon as he ate food. During September the feeling of weakness and fatigue became marked two to three hours after meals and he also noticed that he was running an elevated temperature usually in the neighborhood of 99 to 99.2 degrees Fahrenheit. During the last week of September the attacks assumed a new form and were more severe. The new seizure was in the nature of a desire to sleep. This became progressively worse until he would fall asleep even while working. The patient discovered that if he ate, the desire to sleep was much less than when he went without food. Because of these uncontrollable attacks of narcosis the patient lost his position.

Physical examination revealed no evidence of disease. Complete roentgenological examination gave no evidence of any infection producing the slight elevation of temperature. His blood pressure was 126 systolic and 82 diastolic. Sedimentation rates were only moderately increased in speed but sufficiently so to indicate the presence of an infectious process. Urine examination was negative. Blood studies yielded a hemoglobin of 66 per cent, red blood count of 3,900,000, and a white count of 6,300. Urea nitrogen and creatinin were within normal limits. A fasting blood sugar showed 59 mg. per 100 c.c. of blood. The blood Wassermann was negative.

A diagnosis was made of: (1) Narcolepsy secondary to hypoglycemia, probably due to spontaneous hyperinsulinism; (2) Secondary anemia; (3) Hyperpyrexia of unknown origin.

The patient was then permitted to eat his regular diet and blood sugar determinations were made at various intervals during the day. The results were as follows:

Hour	Calorie Intake	Blood Sugar (mg.)
8:00 a.m.	800	
8:30 a.m.		102
10:30 a.m.		69
12:00 noon	800	
1:00 p.m.		76
3:00 p.m.		58
5:00 p.m.	1000	
6:00 p.m.		75
8:00 p.m.		76

The onset of the attack was aborted at 10:30 a.m. and again at 3 p.m. by the ingestion of a candy bar.

The patient was placed on a diet consisting of 4,600 calories with the feedings divided into two hour intervals during the day. The last meal was eaten at midnight. The attacks of narcolepsy stopped immediately. He was given iron and arsenic for the secondary anemia. His temperature remained elevated for six weeks. At the end of eight weeks his hemoglobin was 86 per cent, red blood count was 4,200,000, and the white count 6,800. The patient was then placed upon his regular diet and instructed to return to the high caloric diet if symptoms returned. Since January, 1933, the patient has followed no special diet and has been free of attacks. Apparently in this instance the presence of a nontuberculous infection played an etiological role in producing the hypoglycemia. This individual represents a case of narcolepsy secondary to hypoglycemia of probable hyperinsulinic origin which was aggravated by an infectious process.

Case 2.—The second patient was thirty-seven years of age and a machinist by occupation. He came under observation in December, 1932, complaining of having "dizzy spells and lapses of memory."

In November, 1931, the patient first noticed that at 8:00 p. m. daily he would be seized with a feeling of "light headedness" and a sensation of "floating in the air." He would be conscious of people about him, but was disorientated as to place and time. Often following such an attack he would find himself some distance from the place at which the attack started. At times he was unable to remember events that occurred during the seizure. The attacks lasted about fifteen minutes and would leave him exhausted. A previous diagnosis of petit mal had been made elsewhere.

Physical examination was interesting in that the

patient's habitus was definitely of the hypopituitary type. The testes were small, although libido was present to a moderate degree. His voice was of high timbre, and the distribution of fat was typically pituitary in type. The breasts were not excessively enlarged. He stated that he always had had a peculiar build. He was forty-two pounds overweight.

Laboratory examinations gave the following results: B. M. R. minus 5; hemoglobin 86 per cent; red blood count 4,600,000; white blood count 9,000; blood Wassermann negative; blood sugar 120 mg. per 100 c.c.

A tentative diagnosis was made of: (1) petit mal or epileptic equivalent; (2) Froelich's syndrome (moderate severity).

The patient was placed on sodium bromide 45 grains daily. There was a slight improvement in his condition; the attacks still occurred but were not as severe. Then one evening I was fortunate in seeing the patient in a particularly severe attack, and he presented the classical picture of hypoglycemic shock. The attack was aborted immediately by orange juice and sugar. A second blood sugar revealed on fasting 126 mg. per 100 c.c. of blood. The attack, however, was so characteristic of hypoglycemic shock that extra feedings were advised and resulted in making the patient worse. It was now felt that the patient probably had a carbohydrate intolerance because of his hypopituitarism and that the sodium bromide had aided in relieving his attack by inhibiting the action of the insulin. On reexamining the patient I was startled to obtain the following additional history. Six months previous to the onset of this illness the patient felt he had to eat more food because of the "heavy nature of his work." He voluntarily placed himself upon a diet of two pounds of candy and three or four malted milks daily in addition to his regular diet. On checking his caloric intake it was discovered that he was ingesting some 6,000 to 8,000 calories daily. The greater part of this food was carbohydrate. He was removed from this diet and placed upon one containing approximately 3,000 calories, and as soon as he started this diet his attacks stopped. He can develop the attacks by increasing this caloric intake to the old amount. He lost twenty-two pounds in weight on his new diet.

This patient then represented a case of carbohydrate intolerance probably due to his hypopituitary state. The excessive amount of carbohydrate ingested in all probability resulted in an increased insulin secretion with a compensatory hypoglycemia following the initial hyperglycemia. The final diagnosis was: (1) petit mal seizures secondary to hypoglycemia of compensatory hyperinsulinic origin; (2) Froelich's syndrome; (3) obesity.

Case 3.—The third case is that of a thirty-six year old electrician, who came in for examination on January 4, 1933, because of "epilepsy."

He had enjoyed good health until 1931, when he noticed that he was developing peculiar "spells." These spells occurred on working days but rarely on Sundays and holidays, and they made their appearance at 10:00 a. m. and 3:00 p. m. The attack consisted of a feeling of weakness and generalized numbness. At the onset he had a complete lapse of memory for events occurring during the attack. The attacks disappeared spontaneously, leaving the patient weak and exhausted. By accident he discovered that the eating of food would abolish the attacks. He consulted a physician in 1931 who told him he was suffering from epilepsy. He recalled that about the time the disease manifested itself he was not receiving proper food and he had gone without meals on many occasions. The attacks were of moderate severity until December, 1932, when they became more frequent. They were now occurring at 1:00 a.m., 10:00 a. m. and 3:00 p. m. The attacks were more severe and he now had the sensation of dissolution. Food and violent physical exercise would abort the seizure.

Physical examination was completely negative.

Laboratory findings were normal except for a fasting blood sugar of 60 mg. per 100 c.c.

On a 2,400 calorie diet the blood sugars at two hour intervals revealed the following values:

Hour	Calorie Intake	Blood Sugar (mg.)
8:00 a.m.	800	
8:30 a.m.		77
10:30 a. m.		69
12:00 noon	800	
1:00 p. m.		110
3:00 p. m.		70
5:00 p. m.	800	
6:00 p. m.		92

The total caloric intake was increased to 4,200 calories and the feedings were divided into two hour intervals. The last feeding took place at 11:00 p. m.

The patient developed no further attacks until March, 1933. At this time he developed a severe upper respiratory infection, and the attacks again made their appearance, occurring six or seven times daily. These were aborted by increasing the number of feedings. The patient remained free from attacks while he remained on his diet.

A final diagnosis was made of spontaneous hyperinsulinism, probably of primary pancreatic origin.

The past few years have seen a great increase in our knowledge concerning the pathology of this disease. In general, those cases reported in which operation or necropsy have been performed may be divided into: (1) those revealing a normal organ; (2) those revealing tumors of the pancreas, either benign or malignant; and (3) those revealing hypertrophic island changes. Wilder[42] furnishes the information that in twenty-nine available cases the island cells were normal in nine instances. It is of course perfectly feasible that, even in the absence of histologic evidence of disease, these cells were, by some inherent dysphysiological factor, able to secrete excessive

amounts of insulin. Nor must it be forgotten that in these instances the hypoglycemia may not have been primarily insulogenic, but rather the result of some other endocrine influence.

Smith,[35] in a recent study of pancreatic tumors, emphasizes the existence of pancreatic adenomas of islet cell origin without any evidence of hypoglycemia. She also concludes that those tumors producing hypoglycemia are in the greater part composed of beta cells. But there is rapidly accumulating evidence to indicate that adenomas of islet cell origin can and do produce hypoglycemic symptoms and that these symptoms are relieved by surgical excision.[7, 8, 18, 26]

In the severe types of hypoglycemia with associated weight loss and irretractable clinical symptoms, adenocarcinoma of the islands of Langerhans have been found. Occasionally there is difficulty in ascertaining the malignancy of these tumors. Wilder has been able to review sixteen island cell tumors since his original description of carcinoma of the island cells. Preoperative diagnoses were made in nine cases and tumors were found at operation.[42]

Hypoglycemia has been found associated with hypertrophy of the islet cells, and at times hypertrophied cells will be found in the region of the adenoma.[26] Phillips[20] and John[32] report hypoglycemia in association with hypertrophied islands. Gray and Feemster,[15] as well as Dubreuil,[10] have reported hypertrophy of the island cells in children of diabetic mothers.

The summation of the pathological evidence to date suggests that hypoglycemia may result from: (a) normal islet cells; (b) islet cell adenomas which may be benign or malignant; and (c) hypertrophied islet cells. A classification, however, entirely based upon pathology is wanting in completeness and the following classification of Gammon and Tenery[13] is suggested:

Endocrine Hypoglycemia
- Pancreatic
  - A. Hyperfunction or hyperinsulinism, diffuse hypertrophy and tumors of the islets; dysinsulinism or dysinsulinosis
  - B. Late diabetes
  - C. Alimentary hypoglycemia
- Suprarenal insufficiency
- Pituitary dysfunction
- Thyroid insufficiency
- Pluriglandular syndromes

Other Types of Hypoglycemia
- Hepatic
- Muscular dystrophy
- Renal diabetes
- Lactation and pregnancy
- Fatigue
- Infections
- Terminal hypoglycemia

The treatment of spontaneous hyperinsulinism offers two alternatives: either medical or surgical. It is understood that the intelligent treatment of the disease is dependent upon the discovery of the etiological factor. The problem resolves itself into either furnishing sufficient carbohydrate to balance the excess of insulin or else to decrease the secretion of insulin by operative removal of part of the pancreas. It is preferable to treat the patient by a dietary régime which will insure him sufficient glucose to prevent attacks. The diet should not only be increased in caloric value, but should contain a low carbohydrate and high fat ratio. By decreasing the carbohydrate intake we may be able to prevent a resultant hypoglycemia. If under dietary management the patient shows no improvement but even becomes worse, we must consider the possibility of surgical exploration. A constant down-hill course suggests the possibility of an adenoma of the islet cells. The surgical removal of adenomas has proven successful, but it is extremely difficult to make this diagnosis unless the patient has been under observation for a long period of time. The continued progress of symptoms under medical management in the presence of a developing cachexia leads us to suspect that malignant changes have occurred in the islet cells.

Because of the lack of sufficiently satisfactory surgical results, exploration is only advisable when dietary régimes have failed. On exploration the pancreas may be normal in appearance, but surgical excision of part of the pancreas is warranted in an attempt to remove part of the island cells. As yet this procedure is wanting in good results, possibly because our lack of knowledge concerning the amount of pancreatic tissue to be removed. The surgical removal of island cell adenomas offers excellent results and a favorable prognosis. Judd and his associates give an excellent review of the surgery of hyperinsulinism in a recent publication.[22] The surgical treatment otherwise is still uncertain and should

only be used when the medical treatment has failed.

Conclusions

1. Three cases of spontaneous hypoglycemia are reported, one due to infection, the second to excessive carbohydrate ingestion with hypopituitarism, and the third to spontaneous hyperinsulinism.

2. It is emphasized that other factors than the pancreas may be of great etiological importance in producing hypoglycemia.

3. The success in therapy is dependent upon the diagnosis of the etiologic factor, and surgical exploration is indicated upon the failure of medical treatment.

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THE LABORATORY TECHNICIAN*

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IN the early days of the clinical laboratory, not so many years ago, it was not uncommon to see a physician perform the function now generally performed by lay workers. In those days, methods universally employed were comparatively few and simple. With rapid advance in diagnostic procedures in recent years, the exactitude of technic and often the complexity of methods employed, as well as the time-consuming technical detail, have come to demand specially trained workers to devote their full time in the clinical laboratory while the physician may devote himself to general supervision, interpretation of findings and consultation. To-day, it is generally accepted that the purely technical or mechanical part of this work may be vested, wisely, in the hands of trained non-medical assistants whose duty it shall be to devote their skill and energy in the performance of the various technical methods demanded of the laboratory. Thus, the laboratory technician has come into being in modern medical practice.

Largely through the insistence of the American Medical Association and the American College of Surgeons that adequate laboratory facilities be available in every hospital of good standing and because of the increasingly important rôle properly rendered laboratory reports play in clinical diagnosis, the service of the laboratory technician has become as indispensable and important as any single auxiliary agency employed in the field of medical practice.

It may be roughly estimated that there are, to-day, between 15,000 and 20,000 laboratory assistants, commonly designated as laboratory technicians, throughout the United States. Many of them are out of employment due to the present economic situation. In addition, approximately 1,000 technicians are being "graduated" annually who are eager to begin their careers as full fledged laboratory technicians. A large majority of them have come into the ranks within the past decade. Among them are many college graduates who either finished a regular university course in medical technology or went into this field after a period of preparatory training or as special workers (such as chemist or bacteriologist, etc.). There are many others with the necessary educational background who received adequate training in a recognized hospital laboratory and became qualified technicians. A large number of these laboratory technicians, however, obtained their training and experience under conditions which have been considered en-

*From the Pathological Laboratory of the Charles T. Miller Hospital, Inc., Saint Paul.

tirely unsatisfactory from a technical standpoint and on ethical grounds. Many of them completed a period of apprenticeship ranging from a few weeks to six months, perhaps in a poorly supervised clinical laboratory where they were engaged as the technician's voluntary helpers for the privilege of "picking up" a few clinical laboratory methods. Many others are so-called "graduates" of the commercial schools for laboratory technicians where they received a course of instruction which, on the whole, has not been found adequate in the making of qualified technicians. A commercial school for technicians has been known to represent an enterprise of unscrupulous promoters who show little regard for professional or business ethics and who are in it purely for their own self-interest.

It is, thus, evident that there actually exists deplorable confusion in the present system of training of laboratory technicians. In a recent survey,[5] out of the 130 hospital laboratories which conduct a technicians' course, twenty-two (16.9 per cent) required college graduation for entrance; nineteen (14.6 per cent) two year college work; forty-three (33.0 per cent) one year college work; and forty-six (35.3 per cent) high school graduation. The length of the course also varied, regardless of the preliminary education, from less than six months, of which there were four, to three years. Seventy-nine (60.0 per cent) required a period of twelve months for the training and twenty-five (19 per cent) less than twelve months. The method of instruction is also by no means uniform. Many of them simply offer the opportunity of purely practical or apprenticeship training without any planned teaching or didactic instruction. A few follow an organized plan of instruction, including minimum hours of didactic teaching. Very few actually carry on regular lecture hours. While these figures and data show a substantial gain over those of two years ago obtained in a similar survey,[3] they indicate definitely a continued lack of uniform standards in the whole program of instruction and training given in these hospital laboratories. When it is realized that the survey did not include the commercial schools, private laboratories and probably many of the hospital laboratories which operate a technicians' course of questionable standing, the problem becomes even greater and more complicated.

The chaotic situation is characteristic of any pioneer movement and undoubtedly subject to gradual evolution and improvement. The first remedial step appears to be a campaign to disseminate information on the present situation among the physicians and to urge the universal acceptance of a minimum standard whereby the qualifications of laboratory technician may be clearly defined as to her preliminary education, practical training and subsequent experience.

The American Society of Clinical Pathologists, composed as it is of physicians primarily interested in laboratory medicine, early took cognizance of the situation and established, in 1928, a Board of Registry of Laboratory Technicians to inaugurate an organized attempt to standardize the qualifications of laboratory technicians and promote the minimum essentials for approval of training schools. The registration of laboratory technicians who possess the necessary minimum qualifications, consisting of one year college credits, including chemistry and biology, or the equivalent, in preliminary education, and not less than twelve months of systematic practical training and experience under a recognized pathologist, soon became a principal function of the Board. The registration of schools for laboratory technicians which meet the essentials for approval has also been undertaken. To date, the Board has issued more than 2,200 certificates of registration to the laboratory technicians who met the requirements. In June, 1933, the Board inaugurated a semi-annual examination of candidates applying for registration. This was done to eliminate those who are deficient in preliminary education, technical training and practical experience, through the medium of written and practical examination and personal interview. The Board accepts only those educational credits and recognizes such instruction and training as are obtained in the institutions which are recognized by the American Society of Clinical Pathologists or the American Medical Association. The Board of Registry has also issued some forty certificates of registration to those universities, colleges and hospital laboratories, which, upon application, were found to conduct an approved course of training according to the minimum requirements.[1]

The program of the Board of Registry has received, from its very inception, the unqualified endorsement and support of both the American Medical Association and American College of

Surgeons, whose representatives have lent their sympathetic coöperation at all times.

Under the date of July 20, 1934, Dr. Malcolm T. MacEachern, Director of Hospital Activities of the American College of Surgeons, wrote to the writer as follows:[4]

"We have not yet made it a requirement that all laboratory technicians be registered. We are urging them to register and, to all intents and purposes, our recommendations may be and are being interpreted as a requirement. In the next two or three years this will virtually be a requirement as it is now to have medical supervision over the laboratory."

The statement is of utmost significance not only to hospitals and technicians but to the practice of medicine, at least, as it is carried on in the hospital.

Regarding the status of the training schools for laboratory technicians, the Board of Registry is now working in close coöperation with the Council on Medical Education and Hospitals of the American Medical Association, whose field inspectors have been conducting investigation of these schools, of which there are more than two hundred throughout the United States. As soon as this inspection is completed, new essentials for approval of these schools will be formulated, jointly by the Council and the Board. The approval of the schools for training of laboratory technicians will then be granted jointly by these two bodies. A model curriculum is being prepared by the Board at this time and will be published as a guide for the schools for technicians.

The Board of Registry is solicitous of enlisting more of the colleges and universities of recognized standing to establish a regular course in medical technology either on a four year basis leading to a degree or on a two year plan leading to a certificate. Perhaps, not more than twelve colleges and universities offer such a course at the present time, which is wholly inadequate to meet the normal demand. The Board, on the other hand, is firmly of the opinion that it would be highly detrimental to the interest of medical practice in general and to laboratory medicine in particular, to countenance any attempt to instruct unqualified individuals or to conduct a course of instruction which does not meet the essential requirements.

The essential qualifications of a laboratory technician may be briefly defined as follows:

1. Preliminary education of four years' high school work and one year college credits, including chemistry and biology or kindred sciences. This is to be increased to two years of college work, including major sciences beginning 1936.

2. Training in an approved clinical laboratory of not less than twelve months.

3. Strict adherence to the code of ethics as defined by the Board. This provides that "all registered technicians shall agree to work under the supervision of a qualified physician and under no circumstances shall they, on their own initiative, render written or oral diagnoses, except in so far as it is self evident in the report, or advise physicians and others in the treatment of disease or operate a clinical laboratory independently without the supervision of a qualified physician or clinical pathologist."[2]

At first glance, these provisions may seem too drastic. However, in view of the increasingly important part the laboratory technician has come to play in medical diagnosis and because of the present tendency of commercially inclined individuals and institutions to maintain a short course of instruction wholly inadequate to meet the responsibilities of a qualified laboratory technician, there is ample justification in demanding that her general intellectual requirements and technical qualifications be elevated, so that the field may not be overcrowded by those of questionable training and experience, and that her activities be strictly defined under all conditions.

The Board of Registry is a voluntary agency under the control of the American Society of Clinical Pathologists. It has no legal authority. It merely serves as an intermediary between the medical profession and laboratory service. It possesses no compulsory power to force technicians to register or to follow its rules and regulations. The Board believes that its guiding principles are sound and for the betterment of the practice of laboratory medicine. It is entitled to the support and coöperation of the medical profession.

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THE ACCESSORY SCAPHOID*

PAUL W. GIESSLER, M.D.
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IN October, 1929, Dr. Frederick Kidner of Detroit, Michigan, reported an operation for flat feet in which the accessory scaphoid was present. He calls it the pre-hallux, on the theory that it is a direct descendant of the sixth toe. It is an extra bone occurring in some feet just internal to or somewhat behind and below the scaphoid. There may be a true joint with cartilage and ligaments between it and the scaphoid or it may be practically fused to the scaphoid. The tibialis posticus tendon attaches to it, nearly enveloping it as it passes on to the under-surface of the cuneiforms and metatarsals. The path of the tendon therefore lies more mesial and dorsal than when it passes beneath the plantar surface of the scaphoid when the accessory scaphoid is absent. Kidner deduces from this condition that the tibialis anticus works at a mechanical disadvantage in this position: that instead of lifting the tarsus directly upward, the tendon is required to pull inward and backward and then upward, so that it pulls at an angle or around a curve instead of in a straight line, and in so doing has to pull through a longer distance, which in turn requires a greater muscular contraction. It was also noted that, as the foot was inverted, the soft tissues were crowded between the accessory scaphoid and the internal malleolus. These conditions result in the typical everted or flat foot, so often seen in company with the accessory scaphoid of any size.

I have recently operated on twelve patients with accessory scaphoids with uniformly good results. All of these patients had marked pronation and all complained of tenderness over the accessory scaphoid. The efficiency of the foot was markedly impaired and complaints varied from inability to engage in athletics to fatigue on walking even a few blocks. The shoes were generally out of shape and in ten cases the scaphoid area was swollen and red, and three patients had developed callus over the bony prominence of the accessory scaphoid. Active supination was definitely limited. Eight patients had tried other treatment, including Thomas heels, one-quarter inch lifts, arch shoes, Whitman arches, and exercises, with partial relief in four cases, but no marked improvement in any.

The operation used was similar to the one Kidner advised. A curved incision was made along the tibialis posticus tendon with the accessory scaphoid as its mid-point. The tendon was exposed and freed above and below the accessory scaphoid. It was then freed from the accessory scaphoid by removing with an osteotome a thin layer of the accessory scaphoid, which remained attached to the tendon. Then the accessory scaphoid was removed and, if the inner edge of the scaphoid was still prominent, a piece of it was removed from its inner and under surface. Dissection was then continued laterally under the scaphoid. A deep chromic stitch then sutured the tendon to the plantar fascia in such a way that the tendon lay under the scaphoid and the raw surface of the thin layer of bone on the tendon faced the denuded surface on the plantar side of the scaphoid. During this fixation the foot was held in supination. After fixation, it was noted that the foot remained in supination. The wound was closed and plaster applied with the foot in supination. Casts remained on for six weeks; during the last two weeks the patients walked on the casts. After removal of casts the heels of the shoes were raised on the inner edge. Whitman arches were used in four cases. Corrective exercises were given. The oldest case is now one year old, postoperatively; the youngest, five months. All patients are markedly improved in foot position, none having more than slight pronation. All report entire absence of pain or discomfort. All are more active than before. Three are not limiting their activity at all, even engaging in athletics. All can actively supinate, even when the weight is borne on one foot.

A more recent article by Dr. Kidner reports his continued success with this operation and, in addition, describes the use of the same operation in cases of flat feet without the accessory scaphoid, where the posterior tibialis tendon passes across the inner side of the scaphoid instead of under it.

*Read before the Clinical Orthopedic Society, Rochester, Minnesota, November, 1933.

THE DOCTORS MAYO CITED BY THE AMERICAN LEGION IN THE PRESENCE OF PRESIDENT ROOSEVELT

For nearly twenty-four hours, including the evening of August 7 and until mid-afternoon of August 8, Rochester was given over to the single purpose of honoring Drs. William J. Mayo and Charles H. Mayo. National Commander of the American Legion, Edward A. Hayes, presented a citation authorized by the national executive committee of the Legion, and the President of the United States, Franklin D. Roosevelt, in person, presented to the brothers a bronze plaque, the gift of the William T. McCoy Post of the Legion.

Ceremonies of Tuesday

On August 7, preceding the president's arrival, a dinner was held at the Kahler hotel. This was attended by about 300 leaders of the medical profession, of the American Legion, of the State of Minnesota, and of the City of Rochester. Guests were welcomed by Mayor Reiter of Rochester.

Following the dinner, the guests adjourned to Soldier Field, the 160-acre municipal playground first purchased and developed by the local post of the Legion. There the guests mounted a floodlighted stand, facing the golf course and a small river, and were presented to 8,000 citizens of Rochester and vicinity. About an hour was occupied in brief addresses, given by a number of the distinguished guests.

Commander Fischer, of the local post, called, in turn, on Floyd B. Olson, governor of Minnesota; Frank B. Kellogg, former secretary of state, once a resident of Rochester, and now a judge of the Permanent Court of International Justice; Fred W. Sargent, president of the Chicago and Northwestern Railway, and National Commander Hayes.

These speakers were followed by four who represented the medical profession. Dr. Francis J. Savage, president of the Minnesota State Medical Association, extended greetings from the 2,000 physicians of the state.

"We hope," he said, "that the high standards of medicine and surgery, which have been fostered here in Rochester under your guidance for so many years, will continue as a stimulus toward the maintenance of similar standards throughout our state for many years to come."

Doctor Savage, "as illustrative of the feeling of friendliness and respect" in which the Doctors Mayo are held by their fellow physicians, then read part of a letter that had been authorized by the council of the Minnesota State Medical Association, and sent to the two brothers.

Dr. Walter A. Bierring, of Des Moines, president of the American Medical Association, said that he considered it "distinctly one of life's privileges to be present and bring cordial greetings on behalf of the American Medical Association."

"Coming to these unbroken prairies the elder Mayo blazed the trail of the medical pioneer, and then let the mantle fall on the shoulders of two worthy sons.

"They have contributed no small part to the remarkable evolution and progress of medical education in America during the last thirty years."

Dr. Bierring was followed by Dr. William D. Haggard, of Nashville, president of the American College of Surgeons. He spoke, in part, as follows:

"The unprecedented nature of the president's participation, as the honorary commander-in-chief of the American Legion, is an honor to which no man can be insensible. It carries the tribute of that great-hearted national humanitarian to the humanitarianism of two also of heroic mold."

The last speaker to represent the medical profession was Dr. Morris Fishbein, editor of the *Journal of the American Medical Association.*

"As a spokesman for organized medicine on this occasion," he said, "may I say that it is my firm belief that only an early affiliation with organized medicine, only mutual confidence between the medical profession and the leaders of this great institution, only that constant interchange of medical work and medical thought, which makes scientific medicine stand superbly above all other sciences and organizations in its ethics and its morale could have permitted the full flowering of the genius which is here apparent. Dr. William Worrall Mayo was himself an organizer of one of the constituent branches of the American Medical Association. In many great medical organizations Drs. William J. and Charles H. Mayo have taken a significant part. Each of them has been on occasion president of the American Medical Association. They have served on scientific boards, on committees, and in many other ways have given freely of their advice and ability for the benefit of their fellow physicians. Yet in all of this work they have conserved the ideals of the profession which every young man receives at his alma mater."

These representatives of the medical profession were succeeded by two representatives of the American Legion: Gerald V. Barron, National Legion committeeman from Minnesota, and Earl V. Cliff, vice chairman of the National Legion Rehabilitation Committee.

To all of these short addresses, Dr. William J. Mayo made response, speaking also in behalf of his brother, who stood beside him on the platform. Parts of Doctor Mayo's speech follow:

"The American Legion, in distinguishing us with its citation for service to the American soldiers, through us pays tribute not only to the 40,000 members of the medical profession who took so honorable a part in the Great War, but also to all members of the medical profession who since the war have served so conscientiously and faithfully in the care of disabled veterans."

"My brother and I greatly appreciate the honors that are being conferred upon us. We realize, however, that we are not the cause, but rather the occasion of the ceremonies which take place tonight and tomorrow."

"We express our thanks to the American Legion for their kindness to us personally. And we may speak for all in voicing appreciation of the service the Legion has rendered this community and the state in acting to bring the President here. The visit the President so graciously makes will be a source of inspiration and renewed courage and enthusiasm to all."

President Roosevelt Arrives on Wednesday

At 5 a. m., August 8, the President arrived in Rochester aboard a special train from the Twin Cities, and a little later most of the residents of the city looked out with despair on low, tumbling clouds which it seemed any second must loose a torrent on bunting, flags and enthusiasm. Miraculously the sky cleared, however, and by eight o'clock one of the sunniest, hottest days of the summer had begun.

Several thousand citizens had gathered at the railroad, to view the train and to await the appearance of the president. Among these citizens were the Mayo brothers, Governor Olson, and representatives of the American Legion, who boarded the train to greet the president.

After leaving the train, the first objective of the presidential party was Mayo Park, where the President placed a wreath at the base of the statue of Dr. William Worrall Mayo. The party then spent about half an hour inspecting The Mayo Clinic.

From there, the President went to Soldier Field, to participate in the program. When he entered the field, "Hail to the Chief" chimed out from the carillon on the tower of the clinic, and the same air was rendered by the drum corps of the William T. McCoy Post of the Legion.

Following preliminary ceremonies and remarks, National Commander Hayes presented the citation to the famous brothers:

"The high esteem in which the Drs. Mayo are held by their comrades—three-quarters of a million Legionnaires—is best expressed in a resolution adopted by the national executive committee of the Legion at its last meeting, held in May. This resolution reads as follows:

"'WHEREAS, The American Legion has always recognized the welfare of humanity and especially the former service man and his dependents, and

"'WHEREAS, during the fifteen years of the organization of the American Legion the continuous and unselfish service rendered the World War veterans and their dependents by Dr. William J. Mayo and Dr. Charles H. Mayo, of Rochester, Minnesota, is outstanding and of great merit; now, therefore, be it

"'Resolved, by the National Executive Committee of the American Legion, this fourth day of May, 1934, that said Dr. William J. Mayo and Dr. Charles H. Mayo be cited by the American Legion for distinguished service to our sick and disabled comrades and to humanity in general, and that a suitable citation be prepared and presented to them.'

"We of the Legion hold in deep respect the man who serves his country in time of great emergency; who continues that service to his community, state and nation in time of peace, and whose breadth of vision and compassion extend beyond geographical lines to an unselfish service to all humanity. In each of the Mayo brothers we find that kind of man. We take a justifiable pride in the fact that they are Legionnaires by right of eligibility, through their service in the World War, and by desire in upholding Legion ideals."

A bronze plaque was next unveiled by a grandson of Dr. W. J. Mayo and a granddaughter of Dr. C. H. Mayo. The plaque was designed by Legionnaire Harold H. Crawford, Rochester architect, the profile portraits of the two brothers were modelled by a daughter of Dr. C. H. Mayo, Mrs. George T. Trenholm, of Rochester, and the sculptor was Charles Brioschi of Saint Paul. This artistic commemorative creation was presented by President Roosevelt, extracts from whose address follow:

"I hope that the people of Rochester will not feel limited in their pride of possession when the nation which I have the honor to represent claims the right to call Dr. Will and Dr. Charles by the good word 'neighbor.' You are beloved at home and abroad and a world deeply in your debt gives you inadequate return in external honors and distinctions. But your true distinction is in the simple fact that you have put men's sense of brotherhood and interdependence into a setting and have given it a new meaning.

"For fifty years you have given tireless, skillful and unselfish service here in this state and city. These fifty years, the span of your medical practice, have covered probably the most remarkable period in the history of science. You have seen practically all of modern medicine and surgery come into being. The rise of research, dating back to the days when you began your practice, has revolutionized the diagnosis, prevention and treatment of disease."

"You have helped to give to the medical profession a unique place in the community and the nation."

"Those of us who are concerned with the problems of government and of economics are under special obligation to modern medicine in two very important respects. In the first place, it has taught us that, with patience and application and skill and courage, it is possible for human beings to control and improve conditions under which they live. It has taught us how science may be made the servant of a richer, more complete common life. And it has taught us more than that, because from it we have learned lessons in the ethics of human relationship—how devotion to the public good, unselfish service, never-ending consideration of human needs—are in themselves conquering forces.

"Democracy looks to the day when these virtues will be required and expected of those who serve the public officially and unofficially. Modern medicine has set an exalted example. It has shown the way for us all.

"You whom we honor today have rendered the highest form of patriotic service during the battles of the World War, but, even more than that, you deserve the nation's thanks for the national service that you have rendered throughout your lives."

For the two hours following the ceremonies at Soldier Field the President was the guest of Dr. and Mrs. Charles H. Mayo, at their home, three miles southwest of Rochester. Here the presidential party had luncheon, thereafter passing through the city in automobiles. A short pause was made at St. Mary's Hospital and then the convoy continued through Rochester and on toward the Mississippi River.

The President viewed a Mississippi River dam in process of construction at Minnieska and then proceeded to Winona where he again boarded his train, which, while the ceremonies were in progress in Rochester, had moved to Winona.

A SIMPLIFIED METHOD OF UVULA AMPUTATION

GERALD M. KOEPCKE, M.D.

Minneapolis

The uvula may cause a variety of symptoms, which may necessitate its amputation. The literature contains many methods for its removal, but the majority of them require special instruments and special technic.

I wish to present a simple method of amputation, which leaves the uvula, when healed, without a trace of an operative defect.

The procedure is as follows: The uvula and adjacent tissue is swabbed two or three times with a 10 per cent solution of cocaine hydrochlorid, which is usually sufficient to assure a fairly complete anesthesia.

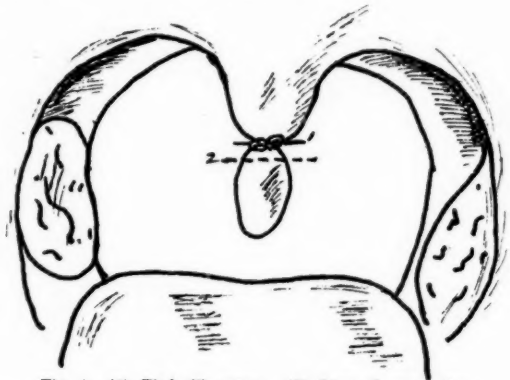

Fig. 1. (1) Tied silk suture. (2) Line of amputation.

A loop of braided silk or catgut suture is made and arranged over the end of a hemostat. The end of the uvula is grasped with the hemostat and the uvula is placed on slight tension. The suture is then slipped forward over the end of the hemostat onto the uvula to the location desired. The loop is then tightened and the tissue compressed, care being taken not to break the membrane with the suture. Following this ligation, the distal end of the uvula, just below the suture, is amputated, allowing a small stump to remain, so that the tied suture will not slip off. The cut surface is cauterized with phenol.

In four to five days this stump will slough off and healing will result in a clean, round wound.

When thoroughly healed, the uvula shows no scarring and the function of the soft palate is not impaired.

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EDITORIAL

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Honoring the Mayo Brothers

Hero worship has always been a human trait and always will be. We love to honor those who have shown outstanding meritorious achievement of any kind. The presentation last month of a citation by the American Legion to Dr. Will and Dr. Charlie Mayo, as these two world renowned surgeons are best known at Rochester, was the occasion of ceremonies participated in by thousands of Legionnaires, guests and spectators, and was so planned that President Roosevelt took part in paying tribute to the Mayo brothers.

During the World War the Mayo brothers were in a position to render great personal service at the Surgeon General's headquarters in Washington, where one of them was constantly on duty, and also at Rochester, where the facilities of The Mayo Clinic were largely utilized by the Government in the training of officers of medical corps. It was, however, in recognition of the distinguished service rendered to disabled veterans of the World War since the Armistice and to humanity in general that the Legion presented the brothers with a citation for their unselfish service.

With so much loose talk nowadays of the failure of the so-called capitalistic system, sight is often lost of the large contributions made to public welfare by those who have profited in large measure through individual initiative. Many instances come to mind where private wealth has been turned over to endowments for the betterment of mankind. Many contributions of funds and service have never become known. The contributions of the Mayo brothers have been of both kinds, but their contributions to medicine in general are outstanding. The generosity of which theirs is an example is one justification for the American system which so far has given rein to individual initiative.

American Dental Association Meeting

A meeting of the American Dental Association resembles in many respects one of the American Medical Association. At the seventy-ninth annual meeting of this national organization of dentists held last month in Saint Paul more than 4,000 of the total membership of 33,000 registered. Although a poor registration had been predicted because of the distance of Saint Paul from the larger population centers in the East, this year's attendance was greater than that in Buffalo two years ago. Last year's meeting was, of course, larger, the association having met with the Chicago Dental Society in Chicago at the time of the World Fair. Doubtless the vacation committee of the association which disseminated information in advance to the membership regarding desirable vacation points in Minnesota and the Northwest and maintained a vacation booth at the meeting was largely responsible for this satisfactory attendance in Saint Paul.

The Dental Association had its sectional meetings, eight of them going at full blast simultaneously for four half-days. The titles of sections such as Orthodontia, Periodontia and Partial

Denture Prosthesis are somewhat mystifying. After all an M.D. is not a D.D.S., nor vice versa, although some have vainly argued this should be. Only the occasional dental student takes both degrees with dental surgery in mind.

American dentistry has without doubt led the field. More specialization in this country may have been a factor. Twenty years ago dentists who had been trained in America were much in demand in such European centers as Vienna and Berlin, at least.

The realization of the importance of dental infections did much for dentistry. The adoption of aseptic technic in the placement of fillings has produced better results. While the pendulum swung too far in the direction of radicalism in tooth extraction, the medical profession was partly responsible and a more conservative attitude is now evident on the part of both the dental and the medical profession.

The dental and medical professions have a common aim and have much the same problems as far as practice is concerned. Coöperation between the two professions has always existed and, it is to be expected, will continue.

Laboratory Technicians

The laboratory technician is a comparatively new creation. As was true of the training of the physician not so long ago there has been a woeful lack of uniformity in educational qualifications and laboratory training of the members of this new profession. Minnesota has had its quota of privately owned schools for technicians operated by lay individuals as commercial enterprises and which have not hesitated to use high pressure advertising methods in obtaining students.

The need for establishment of some order in the evident chaos in this new field has been manifested for some time. The American Society of Clinical Pathologists accepted the challenge by the formation in 1928 of a Board of Registry of Laboratory Technicians. This Board is entirely voluntary and has no legal status but has been devoting its energies in the interest of better medical laboratory work. The American Medical Association and the American College of Surgeons have coöperated with the Board, and, following a survey of some two hundred schools for technicians in this country now being made by the Council on Medical Education of the American Medical Association, the schools meeting the minimum standards will receive certificates issued jointly by the Board and the Council. The medical profession is directly interested in better laboratory service and it is proper that our national organization should have a large part in regulating laboratory work.

The present educational requirement consists of four years of high school, a year of college (to be expanded to two years of college in 1936) and at least twelve months' training in a recognized laboratory. Regulation must move forward gradually. One year of college work devoted to chemistry and biology which is included in the present requirement of the Board on preliminary education seems advisable. The proposed increase to two years of college may be desirable but more than two years of college work would seem a needless expenditure of time and money in preparation for this work.

An article on the subject by Dr. Kano Ikeda, secretary of the Board, entitled "The Laboratory Technician," written especially for the information of our readers, appears in this issue.

SERUM THERAPY IN POLIOMYELITIS

Notwithstanding the total failure of statistical presentations to make a case for serum therapy in this disease, clinical observations almost universally indicate rapid symptomatic response to serum administration. There seems to be an immediate drop in temperature and improvement in symptoms that cannot be totally disregarded. These clinical results have been shown equally after both normal adult serum and convalescent serum, so that there seems to be little preference between these two types of serum. Reports on the use of serum for passive protection in epidemics are inconclusive. It will be difficult to evaluate the efficacy of a prophylactic agent in poliomyelitis on account of the low attack rate even in epidemics, and because there is no method of defining the susceptible group. More data and observation are needed before the final opinion can be given as to the value of serum treatment and prophylaxis in poliomyelitis. (Jour. A. M. A., July 28, 1934, p. 262.)

TOLERANCES FOR ARSENIC, COPPER AND LEAD IN FOODS

The Committee on Foods reports that foods to be eligible for acceptance shall not contain arsenic, copper or lead by contamination in excess of the tolerances established by the United States Department of Agriculture: (a) 1.06 parts of arsenic (as As) per million of food [1.4 parts of arsenic (as As_2O_3) per million of food]. (b) 30 parts of copper (as Cu) per million of food. (c) 2 parts of lead (as Pb) per million of food. (Jour. A. M. A., July 7, 1934, p. 29.)

MEDICAL ECONOMICS

Newspaper Criticism of the Profession

Several Northwest newspapers, notably a recent issue of the Minneapolis *Tribune*, have taken a critical attitude toward the medical profession because of their stand in regard to the socialization of health service. Without careful investigation of the facts in the case editorial disapproval has been expressed and accusations made to the effect that the position taken by organized medicine was influenced by selfishness and showed lack of vision. They have accepted without question statements made by representatives of those organizations that are endeavoring by every possible means to force socialization of medical care.

It is frequently stated that the public is not receiving the medical care it deserves, and particularly that people with low incomes are inadequately cared for. Such statements should be challenged and the accusers be made to produce the facts. While there may be isolated examples of inadequate care among the impoverished classes in some of the larger communities, this is certainly not true in the country as a whole. With but few exceptions members of the medical profession give a considerable portion of their time and effort to individuals whose incomes are temporarily reduced, in many instances knowing that they will never be paid for their services. Certainly there are but few physicians who would refuse to give aid to any deserving individual who comes for relief. A recent survey made of the income of the medical profession in this and adjacent states shows that no revenue is derived from fully one-third of the patients. The medical profession receives no credit for this, nor does it expect it.

It has previously been stated that if the majority of the newspapers were no better informed in other affairs than they are in medicine, the general misinformation must be so great as to make them of doubtful value. Apparently the press is not aware of the fact that the officials of the American Medical Association have accumulated data concerned in the subject of socialization of medicine over a period of many years. Investigations have been made of the various efforts to socialize medicine tried in other countries. Enough time has elapsed to appraise many of these efforts and it is quite evident that they have not alone failed in their objectives, but have lowered the standards of medical care and introduced many new complications in the care of the sick. These data are available in various articles and bulletins published by the Bureau of Economics of the American Medical Association and deserve careful perusal.

Laymen who are endeavoring to force the socialization of medical services make the fundamental error of regarding medicine as just another commodity which can be similarly disposed of. They forget that its consistency is largely of the mind, that it is indelibly a part of the individual physician, and cannot be regulated or disposed of like other commodities. In the hysteria for socialization now rampant it is apparently forgotten that medicine is still as much an art as a science. The importance of the personal relationship between physician and patient, and the necessity of stimulation to individual effort for the progress of medicine and also for the best interests of the patient are also overlooked. Curiously enough, the bait that some of the proponents for socialization hold out to the profession is a promise of an income considerably larger than the average physician now enjoys. If the medical profession were remunerated according to the scale proposed, the government, and that means the public, would have to pay far more for their medical services than they are now doing. It is apparently overlooked that with bureaucratic control of medicine political factors would rapidly invade the ranks, with deterioration of service, and that graft and corruption would eventually destroy one of the finest assets that civilization has as yet produced.

Misguided idealists are taking advantage of a

perplexed public in a time of economic distress to foist their experiments and theories on them. Fortunately, medicine today is rapidly becoming well organized and will endeavor to solve the problem of medical care fairly and intelligently. It would hardly seem necessary to restate the increasing efforts made by the medical profession to obviate disease, curtail its virulence, or prevent further inroads; that their main objective always has been and always will be the welfare of the patient. They do not intend to have the noble heritage of medicine carefully reared through past centuries become the subject of governmental and political control. That a profession knowing its own problems and its own limitations far better than anyone else would be so short-sighted as to follow the will-o-the-wisp of medical socialization is inconceivable.

Conservative Dentists

American physicians watched with great interest the deliberations of the House of Delegates of the American Dental Association in Saint Paul.

The economic and social problems of medicine and dentistry have much in common. Certain it is, at any rate, that any official reorganization of one will inevitably involve the other.

If the dental association had officially accepted health insurance, and, specifically, prepayment plans for the provision of dental service, the position of organized medicine which defined its policy on these matters in no uncertain terms at Cleveland might well have been weakened.

There is every indication, however, that the dentists will stand by their traditional professional conservatism in all matters that might lead to socialization of professional services. They elected their officers for next year on a platform of conservatism as opposed to candidates who were known to hold very liberal views.

The fact that newspaper reports of the proceedings indicated a livelier interest in radical proposals than subsequent elections actually proved to have been the case shows, among other things, that such proposals have what is known as "news value," to the newspapers.

The newspaper report of the talk made by Dr. F. C. Warnshuis of Michigan, speaker of the House of Delegates of the American Medical Association, indicated an enthusiastic espousal of the cause of health insurance on the part of both Dr. Warnshuis and the dentists.

Not Reported

As a matter of record, however, Dr. Warnshuis received his warmest applause after a declaration of the necessity for the medical and dental professions to adhere to their time honored methods of practice. They must not allow themselves, he said, to be lured into any experiments that sacrificed individualism or permitted of compulsion or control by the state. This part of Dr. Warnshuis' talk was not reported.

Sentiment among members of the Michigan House of Delegates has changed completely, according to reliable reports, on the subject of the so-called Michigan Plan, referred to by Dr. Warnshuis and outlined previously in these columns; also health insurance in general. It is altogether probable that the plan will be overwhelmingly rejected when it comes up for final vote this month.

The dentists adopted a ten point program of their own at the Saint Paul meeting which is, however, not comparable to the medical association's ten points except in point of numbers.

Dental "Ten Points"

The dental program is a tentative declaration of principle adopted in preparation for a possible "economic securities" act which may in the future deal with old age pensions, benefits for unemployment and health. It was reported as follows:

Organization dentists should be represented in the formulation of such an act.

It should provide dental care for indigents and needy children.

Consideration should be given to needs and obligations of the people and the taxpayers and to interests of the profession.

Plans should be adaptable to local conditions.

Profit-taking agencies should be excluded.

Dental service and methods of practice should be under control of the profession.

All licensed dentists should be eligible.

Service under the program should be optional.

Dentists should be free to reject patients.

There should be an adequate dental educational program for the public.

County Committees Of Three

Committees in county medical societies whose sole function should be to assist with the operation of local medical relief were first proposed in the bulletin called "Medical Care in the Home" which went to all Minnesota physicians a year ago.

They were duly appointed as suggested in a few counties and they actually functioned in still fewer. But the success of the relief program in those in which they did function has shown clearly the worth of such committees.

It has prompted officials of the State Relief Administration to ask especially that such committees, preferably composed of three members, be organized in every county in the state.

The advantages of these committees to physicians as well as relief officials are obvious. Officers, councilors and local secretaries of the Minnesota State Medical Association are now engaged in a special campaign to secure their organization.

Now Organized In 46 Counties

A survey made by the state office recently showed that a total of forty-six counties have committees of some sort now to handle local problems of relief.

Only a fraction of these have committees whose sole function is facilitation of medical relief.

Some of the committees reported are in fact large community relief committees, made up of lay officials of the community and local dentists as well as doctors. These are *not* medical committees appointed to deal exclusively with medical relief. They will not take the place of the so-called Committees of Three.

Their Functions

As defined recently by the Emergency Advisory Committee of the Council, the functions of these Committees of Three are very real and important. And they are not exclusively advisory.

It will be their task, if there is a dispute about the bill sent in to the relief administration by any physician in their locality, to adjudicate that bill.

If the bill is, in fact, a just bill, it will be their duty to explain it to the relief worker.

If the bill is not a just bill, it will be their duty to explain the matter to the physician.

That means, of course, that the Committee of Three must be a hard working committee. It must be absolutely honest and it must have courage. It must have the respect of other physicians, of the relief worker and of the State Administration officials in St. Paul. Otherwise it is a worthless committee and the way lies open for the employment of state physicians for the emergency medical care of the poor.

They Do It In Wisconsin

Great hope for the successful operation of these committees in Minnesota is to be found in the successful system in operation in Wisconsin.

In Wisconsin, similar Committees of Three members of the state medical society, are required by official regulation of the state relief administration in each county. These committees are official units of the relief system.

In Minnesota, the opinion of these committees will probably be regarded as final in case of dispute . . . provided their reputation for honesty and courage remains beyond question.

Introducing Mr. Larson

One year of experience with medical relief under the plan for payment with federal funds for emergency medical care in relief homes has now been carefully checked by doctors and State Relief Administration officials.

It may be safely said that both doctors and state officials have learned something in that year.

The result of this experience, so far as the doctors are concerned, takes tangible form this month in the person of Mr. George Larson, formerly of Frederic, Wisconsin, and executive secretary of the Polk County Medical Society there, who becomes the special representative of the Minnesota State Medical Association in the field to assist in the operation of this year's medical relief.

Rural Representative

Mr. Larson was chosen for this important job by the House of Delegates of the State Association in Duluth. As secretary of the rural county medical society, he is familiar with all of the problems and difficulties of medical practice in rural communities. In addition, he has taken a leading part in the successful organization of his

county in the Wisconsin relief program last year. His qualifications for similar duty in Minnesota communities are obvious.

The need for a special, organized effort on the part of physicians, to see that medical relief works smoothly and satisfactorily, has been pointed out repeatedly in these columns.

Not only the welfare of relief patients and the efficient expenditure of public funds but the future of medical practice in this state depends upon the wisdom and conscience and energy of the medical profession in the operation of this program.

There is no doubt in the minds of relief officials that relief, on approximately the present scale, will be continued in this country for a tentative period of at least ten years.

Medicine's Share

The fact that emergency medical relief work under the original plan has worked out satisfactorily in a large number of communities shows clearly that the scheme for leaving this care in the hands of the family doctor or the doctor selected individually by the patient himself is sound and feasible.

With the organization of proper committees and the assistance of Mr. Larson there is no reason why these successful communities cannot be multiplied indefinitely so that it may be said proudly of organized medicine that it did more than its share in partnership with the federal government.

Cards For Health

Gay blue, green, red or silver cards go out with monthly statements from the Duluth Clinic. They bear among others the following legends:

"Your life is your most precious possession. Have an Annual Health Examination."

"Regularity of Good Habits Promotes Longevity. Get the habit of having an Annual Health Examination."

"Spring is the season of new life as reflected in nature and mankind. An Annual Health Examination may help you to retain that feeling throughout the year. Have you had yours?"

Let Us Be Sure

An increase in malpractice litigation in New York, is reported by the July issue of *The New York State Journal of Medicine.*

Editorially, this increase is laid, in part, to a more explicit codification of the rights and duties of the physician; in part, to a growing tendency on the part of the public to evade its financial obligations to the medical profession.

Concerning the difficult question of medical testimony in malpractice suits, the editorial says:

"Let us be sure that the physician violates some duty which he owed his patient, which in itself produced the results of which complaint is made; let us make sure that the patient himself was free from any fault or neglect which might have induced his present plight and let us so act in the consulting room, that casual comment cannot be mistaken. Before all, let us not make any patient feel that only we, ourselves, could have been his medical savior."

Minnesota State Board Of Medical Examiners

Winona County Man Convicted Of Violation Of Pharmacy Laws

State of Minnesota vs. A. L. Collen

A. L. Collen, forty-eight years of age, was found guilty on July 10, 1934, by Honorable Leo F. Murphy, Judge of the Winona Municipal Court, of violating the pharmacy laws of the state and was sentenced to pay a fine of $50.00 or serve ten days in the Winona county jail. Collen served the ten days.

Collen was charged with operating a drug store at the village of Dakota in Winona County without having his place of business "in charge of a registered pharmacist, or, during the temporary absence of such registered pharmacist, in charge of a registered assistant pharmacist." The investigation was conducted by Mr. Frank J. Albreter, representing the State Board of Pharmacy.

Collen was acquitted by a jury in October, 1932, at Winona of a charge of practicing healing without a Basic Science Certificate. (MINNESOTA MEDICINE, December, 1932.) In the present case he claimed that he was being persecuted by the state, although admitting that he had no Minnesota license to practice pharmacy. Collen holds no license of any kind in Minnesota but claimed that he had proper credentials in the State of Illinois.

E. D. Libera, County Attorney of Winona county, prosecuted the case for the State. Collen acted as his own attorney.

Medical Board Refuses To Renew Masseur's License

Matter of Renewal of License of Leonard James Chmel, Masseur

At a meeting of the Minnesota State Board of Medical Examiners held on July 14, 1934, the Board voted not to renew the license to practice massage formerly held by Leonard James Chmel who, until early this

spring, maintained an office at 3009 Nicollet Ave., Minneapolis.

Early in January a complaint was made to the State Board of Medical Examiners concerning the treatment administered by Mr. Chmel to a patient in Minneapolis who was afflicted with asthma. The patient died on March 5, 1934. The testimony before the Board showed that the patient was placed upon an orange juice and beef broth diet by Mr. Chmel; that the patient was kept on this diet for approximately five weeks, at the end of which time a physician was called to take over the case.

Masseurs are licensed to give only massage treatments. They are not permitted to prescribe diet nor to practice medicine. In 1930 Chmel was cited before the Board to show cause why the Board should not refuse to renew his massage license. At that time Chmel was using the title of "Doctor" and "Naprapath."

The Board feels in the present case that in order to safeguard the public Chmel's license to practice massage should not be renewed. Although Chmel was furnished with a copy of the charge against him he made no appearance before the Board.

Little Falls Midwife Warned By Medical Board

Following an investigation conducted by the State Board of Medical Examiners into repeated complaints that Mrs. Regina Krzan Dlugi, fifty-three years of age, was practicing medicine and healing without a license, a warning was issued to her to cease such practice, and to confine her work to that of midwifery.

Mrs. Dlugi lives on a farm about two miles east of Little Falls and while she holds a license from the State Board of Medical Examiners to practice midwifery, she has been selling roots and herbs and medicines of various types. In view of all the circumstances in the case, it was thought best by Mr. Austin L. Grimes, County Attorney of Morrison County, and Mr. Brist, representing the Medical Board, that a warning be issued to this woman. Mrs. Dlugi was emphatically told that any violation of the Medical Act or the Basic Science Law in the future would result in her being arrested and brought into court for trial. Mrs. Dlugi admitted having taken care of a number of persons without being licensed to do so, but stated that this was due to the necessity of her making a living. She was informed that that was no excuse for violating the Medical Act and the Basic Science Law, and in a written statement which she signed in the office of Mr. Grimes, she promised that there would be no violation of these laws in the future.

The Medical Board respectfully asks that if any one has any knowledge of Mrs. Dlugi's practicing any form of healing except that of midwifery after August 15, 1934, that it be reported to the Board at 524 Lowry Medical Arts Bldg., Saint Paul.

The Board wishes to express its sincere appreciation to Mr. Grimes for the coöperation he rendered in this case.

Park Rapids Chiropractor Sentenced To Two Years At Hard Labor

State of Minnesota vs. Katie Mae Jenks, D. C.

Mrs. Katie Mae Jenks, forty-five years of age, licensed to practice chiropractic since 1919, entered a plea of guilty to a charge of criminal abortion on July 25, 1934, before the Honorable Anton Thompson, Judge of the District Court at Alexandria, Minnesota. The Court sentenced Mrs. Jenks to a term of two years at hard labor in the Women's Reformatory at Shakopee, Minnesota. Mrs. Jenks started serving her sentence July 30.

Early in June a five months' fetus was discovered in a newly made grave near Bluffton in Otter Tail County. The matter was reported to the authorities of Otter Tail and Wadena Counties and later to the State Board of Medical Examiners. Following an intensive investigation warrants were issued for the arrest of Mrs. Jenks, who had an office at Park Rapids, and for Lester W. Mansur, Wadena.

Mansur, twenty-nine years of age, confessed to hiring Mrs. Jenks to do an abortion on a friend of his residing near Sebeka. Mrs. Jenks was paid $35.00 for her "service." The abortion was attempted at Park Rapids but was not a success; it was attempted again and finally completed at Wadena by Mrs. Jenks. Mansur received a sentence of one year in the state prison at Stillwater for his part in the affair.

Judge Thompson, who resides at Fergus Falls, severely rebuked Mrs. Jenks for engaging in such an occupation. The Court also informed Mansur that his part in the crime was not to be tolerated by the law. Judge Thompson commended the authorities of Otter Tail, Wadena and Hubbard Counties and the State Board of Medical Examiners for working on the case until it was solved.

The Medical Board believes that the splendid work of the following men should be made known, especially in view of the fact that the case involved the jurisdiction of three counties and very little evidence was available at the start of the investigation:

Mr. Charles L. Clark, County Attorney, Hubbard County.
Mr. Ed Churchill, Sheriff, Hubbard County.
Mr. Hugh G. Parker, County Attorney, Wadena County.
Mr. John Bengtson, Sheriff, Wadena County.
Mr. R. C. Kassube, Chief of Police, Wadena.
Mr. A. O. Lee, Police Officer, Wadena.
Mr. John L. Townley, County Attorney, Otter Tail County.
Mr. J. C. Henkes, Sheriff, Otter Tail County.

Wadena Woman Pleads Guilty To Unlawful Practice Of Healing

State of Minnesota vs. Letha Beach, Alias Letha Byers

Mrs. Letha Beach, alias Letha Byers, thirty-nine years of age, entered a plea of guilty to a charge of practicing healing without a Basic Science certificate when arraigned before the Honorable Anton Thompson, Judge of the District court at Fergus Falls on August 3, 1934.

Mrs. Beach was arrested on July 31 following an investigation conducted by the State Board of Medical Examiners in coöperation with Sheriff John Bengtson of Wadena county and Sheriff J. C. Henkes of Otter Tail county. The investigation disclosed that on June 26, 27 and 28, Mrs. Beach represented herself as a physician from the state of Nebraska and sold roots and herb medicine to two different parties at Henning, Minnesota, obtaining $4.00 from one and $15.00 from the second patient. Mrs. Beach also falsely represented herself as being associated with members of the medical profession in that vicinity. Mrs. Beach is not connected with any members of the medical profession and so admitted when questioned under arrest.

The defendant admitted she knew nothing about the practice of healing and also admitted that she is the same party that a warrant was issued for in September, 1928, in Redwood county, Minnesota. She was not arrested at that time because she found out she was under investigation and immediately left the community. Mrs. Beach was engaged in the same type of "healing" in 1928, selling roots and herbs at Wanda.

Judge Thompson sentenced the defendant to a term of one year at hard labor in the county jail of Otter Tail County and placed her on probation until December, 1935. The defendant is to refrain from practicing healing in any form in this state and is to return the money she obtained from her patients at Henning. The Court in very strenuous terms denounced the conduct of the defendant and informed her that if any complaint was made about her violating the law in the future she would have to serve her entire sentence.

The Medical Board wishes to acknowledge the splendid coöperation shown in this case by Sheriff Bengtson of Wadena and Sheriff Henkes of Fergus Falls. The state was represented by Mr. John L. Townley, county attorney of Otter Tail County, who once more showed his willingness to assist the Board in eliminating such quackery.

List Of Physicians Licensed By The Minnesota State Board Of Medical Examiners, July 14, 1934 June Examination

By Examination

Adkins, Galen Horatio, U. of Minn., M.B., 1934, Minneapolis, Minn.

Barton, John Currer, U. of Minn., M.B., 1934, Wauwatosa, Wis.

Bate, Leonard Coleman, U. of Minn., M.B., 1933; M.D., 1934, St. Paul, Minn.

Beek, Harvey Ogden, U. of Minn., M.B., 1933; M.D., 1934, St. Paul, Minn.

Bowers, Warner Fremont, U. of Nebr., M.D., 1932, Minneapolis, Minn.

Brust, John Calvin M., Syracuse U., M.D., 1929, Rochester, Minn.

Canfield, Bruce H., U. of Minn., M.B., 1933, St. Paul, Minn.

Clifford, Geo. William, U. of Minn., M.B., 1932; M.D., 1933, Osakis, Minn.

Coddon, Walter David, U. of Minn., M.B., 1934, St. Paul, Minn.

Curtis, Rauen Archibald, U. of Minn., M.B., 1933; M.D., 1934, Osseo, Minn.

Dahlquist, Ralph Morris, U. of Minn., M.B., 1934, Hackensack, N. J.

Flynn, John Edward, Jr., U. of Minn., M.B., 1934, St. Paul, Minn.

Greenberg, Harold Armand, U. of Minn., M.B., 1932; M.D., 1933, St. Paul, Minn.

Holt, Geo. Waltermann, U. of Pa., M.D., 1933, Minneapolis, Minn.

Jacobs, Douglas Lien, U. of Minn., M.B., 1934, Eloise, Mich.

Laymon, Carl Warren, U. of Minn., M.B., 1930; M.D., 1931, Minneapolis, Minn.

Leclercq, Geo. Theo. A., U. of Minn., M.B., 1933, Minneapolis, Minn.

Levant, Arthur Buchman, U. of Minn., MB., 1934, Minneapolis, Minn.

Lind, Carl John, Jr., U. of Minn., M.B., 1933; M.D., 1934, Minneapolis, Minn.

Lund, Carl John Theo., U. of Minn., M.B., 1932; M.D., 1933, Underwood, Minn.

Merritt, Wallace Alfred, U. of Minn., M.B., 1932; M.D., 1933, Albert Lea, Minn.

Monson, Leonard Jerome, U. of Minn., M.B., 1932, Hendricks, Minn.

Roberts, Stanley Warner, U. of Nebr., M.B., 1933, Minneapolis, Minn.

Rumball, John Marcus, U. of Minn., M.B., 1934, Rochester, N. Y.

Sandt, Karl Eugene, U. of Minn., M.B., 1934, Detroit, Mich.

Sarnecki, Marchislaw Maurice, N. W. Univ., M.B., 1933; M.D., 1934, St. Paul, Minn.

Stein, Sam Irving, U. of Minn., M.B. and M.D., 1934, St. Paul, Minn.

Straus, Maurice L., U. of Minn., M.B., 1934, St. Cloud, Minn.

Trytten, Edwin Gerhardt, Rush Med. Col., M.D., 1934, Albert Lea, Minn.

Virnig, Mark Phillip, U. of Minn., M.B., 1933, New Richland, Minn.

Wallace, Marc J., U. of Minn., M.B., 1934, Passaic, N. J.

Williams, Alvin Beurlen, U. of Minn., M.B., 1934, San Jose, Calif.

Zintek, Arthur Raymond, Marquette U., M.D., 1934, Milwaukee, Wis.

By Reciprocity

Haugen, Clifford Olgar, Rush Med. Col., M.D., 1930, Grand Forks, N. D.

By National Board

Catlin, Theodore John, U. of Minn., M.B., 1932; M.D., 1933, Buffalo, Minn.

Shellman, McClelland, U. of Minn., M.B., 1933; M.D., 1934, St. Paul, Minn.

President's Letter

The September Postgraduate Course

After the satisfactory response to the postgraduate course last spring, the University is repeating this opportunity for a second intensive two-day course on September 24 and 25. Not only is it offering this course, but it is allowing us to name our own clinical subjects. It will not be possible in two days to cover all the subjects listed below, but those which will be given will be taken from the lists submitted.

One half-day will be devoted to diabetes, from a clinical list submitted by Dr. Wilder; one half-day to tuberculosis, from a list of clinical subjects submitted by Dr. J. A. Myers and a group of tuberculosis sanatoria superintendents; Monday evening will be given over to the subject of cancer, the subjects chosen by Dr. W. A. O'Brien, and one half-day to heart subjects from a list submitted by Dr. Edgar Herrmann. In addition, the staff of the Minneapolis General Hospital is giving a half-day fracture clinic.

The attendance last spring was 128, more than three times that of any previous similar course, and we hope at least to duplicate that record.

The following are the lists of subjects submitted:

Diabetes:

1. The theory of diabetes: parts played by liver, pancreas, adrenals, pituitary.
2. The diagnosis of diabetes: innocent glycosurias.
3. The diet in the treatment of diabetes: high fat versus high carbohydrate.
4. Insulin: indications for its use.
5. The insulin reaction: hyper-insulinism.
6. Educating the patient: what the patient must know.
7. The treatment of the diabetes of children.
8. The complications of diabetes and their treatment.
9. Surgery in the presence of diabetes.
10. Diabetes and pregnancy.

Tuberculosis:

1. The x-ray in tuberculosis with demonstration.
2. Pneumothorax with demonstration.
3. The Mantoux tuberculin test with demonstration.
4. The dangers of tuberculosis to other members of the family.
5. The pathology of tuberculosis with demonstration.
6. Differential diagnosis.
7. The control of tuberculosis during pregnancy.
8. Surgery of pulmonary tuberculosis, including phrenic exeresis, extrapleural thoracoplasty, and pneumolysis.
9. Tuberculosis at the various age periods of life.
10. Epidemiology of tuberculosis—contacts, uncoöperative patients (refuse sanatorium care), discharged ex-service men still infective, teachers, routine examination for tuberculosis.
11. Outline of intensive conservative treatment.
12. The early diagnosis of clinical tuberculosis with the aid of the tuberculin test and the x-ray.
13. The treatment of minimal tuberculosis of the lungs.
14. Prognosis, determination of activity of lesions.
15. Principles of rest treatment of pulmonary tuberculosis.
16. Relation of rest treatment of pulmonary tuberculosis to surgical and other measures.
17. Diabetes complicating pulmonary tuberculosis (treatment).
18. Silicoses, differential diagnosis: x-ray and clinical.

Heart:

1. What constitutes the clinically significant heart in childhood.
2. Prevention of heart disease. An inquiry.
3. The practical therapeutics of cardiac decompensation.
4. Hypertension. What point of view shall we adopt with reference to classification and need of treatment.
5. The coronary heart: signs and symptoms of the less obvious syndromes.
   Treatment of the latent period
   Treatment of the acute attack
6. The luetic heart: its diagnosis and treatment.
7. Valvular lesions: their prevention; their management.
8. When should one use the electrocardiograph?

President, Minnesota State Medical Association.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

MEETING OF MAY 3, 1934

The President, DR. KENNETH BULKLEY, in the Chair

THE TREATMENT OF ACUTE EMPYEMA

DR. H. A. CARLSON (by invitation): Empyema is rarely a primary disease. It is nearly always secondary to some other condition and the results of treatment depend to a large extent upon the nature of the primary disease, pneumonia, lung abscess, pyemia, tuberculosis, carcinoma, etc. The virulence of the infecting organism, the age of the patient, and complications are also important.

Uncomplicated unilateral empyema has practically no mortality. Death in empyema is nearly always due to a persistence of the primary disease, the development of complications or some accident of treatment.

The value of any method of treatment is to be judged not only upon the mortality but upon the incidence of chronicity, and the time required for healing. As a matter of fact a review of statistics fails to reveal any conclusive evidence in favor of any one method. On the other hand there is an abundance of evidence to demonstrate that the mortality is determined largely by factors unrelated to treatment. Graphs are presented illustrating this point.

Certain fundamental principles of treatment should guide us in treating empyema. Harrington has listed these principles about as follows: (1) adequate drainage; (2) avoidance of early open pneumothorax; (3) sterilization of the diseased area, and (4) re-expansion of the lung and obliteration of the cavity.

What constituted adequate drainage in one case may be inadequate in another. Some empyema cavities apparently heal without drainage. Aspiration constitutes adequate drainage in many instances. Closed drainage may suffice, but often rib resection and the introduction of a large tube is necessary. An opinion as to the adequacy of drainage must be made in each case on the basis of evidence of sepsis and the tendency of the cavity to heal.

Avoidance of early open pneumothorax in the empyemas of the war time influenza epidemic undoubtedly led to a saving of lives, but the lesson appears to have been well learned, and no extended discussion of this subject is necessary.

Sterilizations of the cavity may be aided by irrigations with Dakin's or other solutions, but the pleura has the capacity of sterilizing itself and some authors believe irrigations are unnecessary.

The principle of re-expanding the lung merits greater consideration than it has received in the past. Re-expansion is provided by differential pressure either by the use of closed negative pressure or by overhead positive pressure. The use of blow bottles, wind instruments, etc., is designed to aid in the expansion of the lung but these methods provide for only temporary inflation of the lung. It appears certain that continuous differential pressure is superior to intermittent blowing exercises.

There are essentially three methods of treating empyema: (1) aspirations with or without air replacement; (2) closed intercostal drainage; and (3) open thoracotomy, usually with resection of a rib. Modifications and combinations of these methods have been employed. From a study of 70 cases of acute postpneumonic empyemas, it appears that each of these three methods has certain advantages and disadvantages and each has a field of usefulness.

Aspiration appears to be the safest method of treatment in the early stages before the pus has become thick, before pleural adhesions have formed, before mediastinal stabilization has occurred and during the synpneumonic stage. It is not always wise to persist in the use of aspiration, however, because drainage may be inadequate, frequently sepsis is not relieved and the period of healing and the period of hospitalization are prolonged.

The closed method of drainage is physiologically ideal in providing for negative intrathoracic pressure, but frequently is unsuccessful because the tube becomes plugged. In two-thirds of the cases treated by this method at the University Hospital rib resection was eventually performed.

Open thoracotomy when performed under proper indications does not increase the mortality; it shortens the period of sepsis, the period of healing and the period of hospitalization.

Keeping these fundamental principles in mind I have recently instituted a method of treatment which promises to shorten the period of healing, especially of larger cavities with thick fibrinous exudates.

The method consists of employing aspiration until the pus is thick. Then a rib resection is performed and a large tube inserted, but, instead of leaving the cavity exposed to atmospheric air, a differential pressure is provided by means of a negative pressure system. The wound is sealed by passing the tube through a rubber sponge impregnated with vaseline, which is then snugly pressed against the chest by means of adhesive and elastic bandages. The drainage tube is connected with a pus trap and a controlled negative pressure is maintained by means of a water pump, a manometer and a negative pressure mercury valve. A pressure of 10 to 30 centimeters of water is used.

The results obtained in three cases treated by this method are shown by means of a series of x-ray films.

No rigid routine of treatment is advocated. Empyema should be treated according to the principles enunciated earlier, but when the pus is thick and the cavities large it appears that both adequate drainage and early re-expansion of the lung are of great impor-

tance. These ends can be obtained by the method described, apparently shortening the period of healing and reducing the danger of progression to the chronic stage.

THE TREATMENT OF DEFECTS IN THE LONG BONES FOLLOWING SUB-PERIOSTEAL RESECTION

DR. WALLACE H. COLE (by invitation): The resection of long bones for acute osteomyelitis has fortunately fallen into disrepute but there are still some cases coming into our clinics in which this procedure has been used. I wish to report two cases where this radical treatment was used with no regeneration of bone afterward and consequently the development of marked functional and anatomical deformities. The question of the advisability of resection is answered by a simple examination of the radiographs taken when these cases first reported for reconstruction work.

(A lantern slide demonstration of the cases was then given.)

Case 1.—A boy thirteen years of age, who had had resection of the shaft of the right radius and right tibia for acute osteomyelitis eighteen months before. As a result only a small fragment of the distal end of the radius was left and the tibia was represented by its upper and lower extermities only. The fibula was dislocated at both its upper and lower ends, due to normal growth as opposed to the resected tibia.

The treatment consisted of stretching the soft parts of the leg and getting the fibula into approximately its normal position by skeletal traction through the os calcis. Later the lower end of the fibula was transplanted across into the distal tibial fragment and when this had healed the upper end of the fibula was transplanted likewise. The end-result was a firm union with a straight leg, useful without any external support. The right forearm was treated by dividing the ulna and resecting a small pliece of its shaft so as to allow a "Y" reconstruction, the distal radial fragment being used as one arm of the "Y." As the result of this procedure the hand was held in good position and developed excellent function although there was, of course, no supination or pronation.

Case 2.—A boy twelve years of age who five years previously had had resection of the left tibia for acute osteomyelitis. When first seen the upper and lower extremities of the tibia were alone present and there was a marked bowing of the leg with extreme prominence of the upper and lower ends of the fibula. Here again the leg was straightened and stretched by skeletal traction through the os calcis and then later instead of transplanting the fibula a large bony graft was removed from the opposite leg and inserted between the tibial fragments. This healed readily and the graft since that time has definitely hypertrophied so that the patient is now able to get around without any splint support.

These two cases demonstrate the dangers of subperiosteal resection of bone even in children where the periosteum presumably is very active and also show two ways in which defects of the tibia can be repaired, both of which are very satisfactory.

MIXED TUMORS

DR. WILLIAM T. PEYTON: The treatment of mixed tumors is very unsatisfactory. Approximately 45 per cent of those removed from the parotid recur. Two-thirds of all these tumors occur in the parotid, but they also occur in the submaxillary gland, sublingual gland, palate, pharynx, cheek, lacrimal gland, lips and tongue.

It is proposed to discuss some of the various phases of this lesion in connection with the treatment of patients at the University Hospital.

Thirty-six patients with this type of lesion were seen in the last ten years: twenty-five in the parotid, eight of them recurrent; six in the submaxillary gland, four of them recurrent; two in the cheek, two in the pharynx, and one in the palate.

Late recurrences are prone to be found in this type of tumor. One of the recurrent parotid lesions excised in 1907 recurred in 1932. Recurrences may be due to small masses of tumor cells in the capsules which are left at the time of removal, to a rupture in the capsule during enucleation, or to multple tumors, one of which was overlooked at the time of operation. Apparent recurrence may also be due to the development of an entirely new tumor.

Recurrences are most common in the parotid tumors where the surgeon in his anxiety to avoid the seventh nerve is more conservative in tissue removal and at times it is necessary to deliberately open the capsule of the tumor, remove its contents, and then depend upon antiseptics or irradiation or both to destroy any remaining tumor cells. In three patients the capsule was thus opened and the tumor content removed; then radium was inserted around the remaining part of the capsule. In one of these cases done two years ago, the patient immediately had a small nodule appear which has remained the same ever since. The other two were done fourteen months ago, and one of these patients has a nodule which promptly reappeared, but has remained stationary; the other has no evidence of tumor at this time.

Three patients came with seventh nerve paralysis; all three proved to have highly malignant tumors, with metastatic lymph nodes in the neck or squamous cell carcinoma in the sections of the tumor.

These highly malignant mixed tumors are rarely, if ever, cured. There were six definitely malignant lesions in this group: one was not traced; two are dead; two are in very poor condition, and one on whom a neck dissection for metastatic nodes was done seven months ago has no evidence of recurrence at this time. The prognosis is so bad in these very malignant lesions that it is questionable whether a neck dissection should be done.

Some of these tumors such as those discussed above are distinctly malignant, but, as a rule, distinction between benign and malignant forms is not well defined. Even the microscopic appearance is not reliable.

To avoid injury of the seventh nerve when the tumor is in the lower part of the parotid, Sistrunk made the incision in the folds of the skin of the neck below the parotid isolated and the inframandibular branch of the seventh nerve and followed it up to the division of the seventh nerve into temporo-facial and cervico-facial divisions, inserting the finger along superficially to the nerve. The tumor is superficial to the finger and the nerve is thus out of danger. A case is demonstrated, however, where the tumor was deep about the trunk of

the nerve before its partition into divisions. The nerve grooved the middle of the tumor. It was isolated and the tumor tipped out from under it.

Seven patients were treated with radiation only and in five there has been complete regression of the lesion. One of these, a mixed tumor of the palate, recurred and the patient is now dead.

Of the remaining two, one remained unchanged and one was improved, but the patient is now in a terminal condition.

THE RESULTS OF CHOLECYSTECTOMY IN TYPHOID CARRIERS

DR. N. LOGAN LEVEN (by invitation): The accomplishment of preventive medicine in practically eliminating typhoid fever from the war zone during the late World War unfortunately has not been duplicated in peace time. Compulsory immunization by vaccination against typhoid and early detection and supervision of typhoid carriers are very difficult to carry out in civil practice.

The involvement in typhoid fever of the biliary system has been known for a long time.

In 1829, Louis pointed out that changes in the biliary tract are much more frequent in the course of typhoid fever than in any other acute disease.

Fütterer, in 1888, was the first to demonstrate typhoid bacilli in the gallbladder. About 70 per cent of gallbladder cultures in fatal typhoid cases show the presence of the Bacillus typhosus.

Experimentally and clinically it has been demonstrated that the gallbladder may remain the nidus for the infection long after the disease.

Garbot made an extensive study of the pathogenesis of the carrier state and demonstrated that the carrier distributes bacteria either through the urine or feces or both. In only about 1 per cent does bacilluria continue for as long as two or three months; whereas, in about one third of the cases, positive duodenal or stool cultures were found during convalescence. However, only 3 to 4 per cent continued to be chronic carriers.

The nidus of infection carriers may be: (1) liver; (2) gallbladder; (3) intestine. The great majority are bile carriers and of the gallbladder type. The intestinal carrier is very rare and can be differentiated from the bile carrier by the absence of Bacillus typhosus in the duodenal contents. However, it is impossible to differentiate the duct or liver from the gallbladder type of bile carriers preoperatively.

There are two possible modes of infection of the gallbladder: (1) ascending from the bowel; and (2) hematogenous with the excretion of the bacilli in the bile. The evidence favors the latter route since in the early stages typhoid fever is essentially a blood stream infection, and, also, the typhoid bacillus is usually obtained in pure culture from the gallbladder, whereas, an ascending infection should show a mixed type of infection.

In typhoid carriers the presence of gallstones will prevent the gallbladder from freeing itself from typhoid infection indefinitely. As long as a stone remains in the gallbladder it both hinders mechanically the complete evacuation of the infected bile and reinfects the fresh incoming bile.

Hasland and Whipple, in their combined series of twenty-eight cases of carriers operated upon, found gallstones in 90 per cent of the cases.

Dehler, in 1907, was the first to attempt to cure a chronic typhoid carrier by gallbladder operation. He performed cholecystostomy in two cases, curing one.

Koch (1908) stated that "with the radical removal of the gallbladder the chief focus of the bacillus is removed from the body."

Most of the poor results in operations on typhoid carriers by earlier surgeons were due to the fact that cholecystostomy was the operation of choice.

Hasland reported a series of fourteen cases, twelve of which were known to be typhoid carriers preoperatively. In two others a pure culture of the paratyphoid bacillus was found in gallbladders removed for stones. Eleven of 13 cases surviving the operation were cured of their carrier state.

In Whipple's series of fourteen cases, eight were known to be carriers before operation, and six were probable carriers as demonstrated by routine cultures of gallbladder bile, stones, or gallbladder tissue at operation.

Cholecystostomy cured two patients. In a series of twelve cholecystectomies, eight of ten surviving the operation were apparently cured.

Kehr performed cholecystectomy and common duct drainage with a T-tube in 10 cases, all of which were completely cured of the carrier state. He points out that common duct drainage is necessary as long as bacilli are demonstrable in the bile, since often the drainage through the papilla of Vater is not sufficient after cholecystectomy to clear up the infection in the biliary passages.

Lyon reports a case that continued as a typhoid carrier following cholecystectomy, having a typhoid hepatocholangeitis. This completely cleared up on intermittent and continuous biliary drainage and no typhoid bacilli have been found in the course of five years.

I wish to report three cases on which cholecystectomy was performed for a carrier state as well as for clinical gallbladder disease.

Case 1.—A baker, aged 54, was seen March 11, 1930. He had had typhoid fever in 1910 and was found to be a carrier in 1926, when taking the examination in New York State as a food handler. The cholecystogram showed a pathological gallbladder with stones and on March 19, 1930, a cholecystectomy and repair of an umbilical hernia were performed. Culture of the gallbladder bile and gallstones removed at operation demonstrated the presence of typhoid bacilli. Stool cultures were positive two months after the operation. Since then there have been twenty negative stool examinations over a period of four years. Three recent cultures of duodenal contents were negative for the typhoid bacillus.

Case 2.—A housewife, aged 43, was first seen September 1, 1932. She had had typhoid fever in June, 1927, and proved to be a typhoid carrier in October, 1929. She had had symptoms of gallbladder disease intermittently for six years prior to admission to the hospital. A cholecystogram showed a pathological gallbladder. On September 7, 1932, a cholecystectomy and

appendectomy was performed. Cultures of the gallbladder bile, gallstones, and sections of the wall of the gallbladder showed the presence of the typhoid bacillus. In twenty-one stool cultures over a period of eighteen months following operation, the typhoid bacillus was never isolated.

Case 3.—A housewife, aged 33, was admitted to the hospital January 5, 1933. She had had typhoid fever in May, 1931, and had had intermittent attacks of gallbladder disease since August, 1931. She proved to be a typhoid carrier in November, 1932. The cholecystogram showed a pathological gallbladder and on January 11, 1933, a cholecystectomy was performed. Cultures of the gallbladder bile, gallstones, and sections of the wall of the gallbladder showed the presence of the typhoid bacillus. The thirteen stool cultures over a period of fifteen months following operation were consistently negative.

Conclusion.—Since the majority of typhoid carriers are bile carriers of the gallbladder type, it is evident that these unfortunate individuals, who bear the stigma of being a carrier and who are subject to physical and occupational restrictions by the health authorities, can in a large majority of cases be cured of their carrier state by removal of the gallbladder and drainage of the common bile duct.

DYSPEPSIA FOLLOWING CHOLECYSTECTOMY

DR. MELVILLE H. MANSON (by invitation): The most important phase of chronic gallbladder disease, from the patient's point of view, is "What measure of relief may I expect if my gallbladder is removed?" The majority of patients seek relief because of chronic gastric distress and dyspepsia, rather than for typical "stone colic" pain. Therefore, it is justifiable to devote some attention to the end-results as far as these symptoms are concerned.

In general, it may be said that good results follow cholecystectomy in two-thirds or more of the cases. The best results are obtained in patients whose preoperative symptoms include colic, chills, and fever. The presence of stones prognosticates a better end-result. In evaluating "excellent results," "good results," or "poor results," there is obviously room for a wide latitude of opinion. Because of the tendency for some practitioners to discredit the results of surgical treatment because the patient still has selective food distress, or belching of gas after cholecystectomy, and in the hope of being more accurately able to answer the patient's question, as stated above, the following analysis was made.

A questionnaire was sent to 500 patients upon whom cholecystectomy had been performed, of which 230 were returned with the necessary information required for analysis. To the question, "Can you eat types of food which caused distress before your operation?" 67.2 per cent answered, "Yes"; 32.8 per cent answered "No"; 93 per cent reported a good appetite. Thus it is seen that slightly more than two-thirds of the patients had obtained complete relief from selective food distress.

The results of medical management of chronic gallbladder disease with respect to selective food distress, according to Mason, was that 28 per cent of the patients continued to have their symptoms; 31 per cent showed improvement; and 41 per cent could eat foods which previously disturbed them, *i.e.*, obtained complete relief. Relief from the belching of gas in 100 cases treated surgically was obtained in 83 per cent, whereas, of those treated medically, 66 per cent were given relief.

It is the remaining third of the patients who allow criticism of the results of surgery in chronic cholecystitis with respect to food distress, and it occurred to the writer that this was not justified, for might not individuals with no gallbladder disease exhibit food distress in similar proportions?

	Gall-bladder patients before operation, 250 cases	Gall-bladder patients after operation, 250 cases	Controls, females 30-45 years, 100 cases	Controls, females 18-20 years, 144 cases.
	Per cent distressed	Per cent distressed	Per cent distressed	Per cent distressed
Fried meats	76	36	25	2.7
Baker meats	34	14	5	1.0
Pickles—condiments	54	29	15	2.3
Cabbage	66	43	38	17.0
Onions	66	43	29	17.3
Beans	52	40	33	13.8
Raw apples	40	24	17	7.0
Potatoes—fried	66	33	16	3.6
Eggs—fried	60	30	23	5.0
Pie crust	50	27	13	2.0
Nuts	38	25	14	6.0

50 per cent can eat any type of food after cholecystectomy.
67 per cent can eat foods which previously distressed them.
70 per cent of controls (females 30 to 45 years of age) have food distress.
50 per cent of controls (females 18 to 20 years of age) have food distress.

Accordingly, an identical food list in the form of a questionnaire was given 144 student nurses, ranging in age from eighteen to twenty years. A report was also obtained from 100 female out-patients from thirty to forty-five years of age, who had no gallbladder or gastro-intestinal disease, or rather, who had no symptoms indicative of gallbladder disease (see chart).

Although it is apparent that those following cholecystectomy have slightly more distress than the group of women with no gallbladder symptoms, the difference is slight and probably within the limit of error. It was rather surprising to discover that 50 per cent of the young women had food distress. In requesting those in each group to fill out the questionnaire it was emphasized that only foods which caused distress or gas be listed, not foods which were disliked or to which they had a specific idiosyncrasy.

From the results above it may be concluded that the surgical treatment of chronic cholecystitis results in relief from food distress and gas to a point comparable to that of normal individuals.

NEUROGENIC VESICAL DYSFUNCTION: REPORT OF TWO CASES RELIEVED BY PRESACRAL NEURECTOMY AND CYSTOSTOMY

DR. C. D. CREEVY (by invitation): The term neurogenic vesical dysfunction refers to any disturbance of bladder activity resulting from disease of the nervous system and is to be preferred to the older and more ambiguous terms "cord" or "neurogenic" bladder. These disturbances may result from lesions of the brain, spinal cord, peripheral nerves, or of the ganglia in the bladder wall, through injury or destruction of the centers for bladder function or of their afferent or efferent pathways.

I shall limit my remarks this evening to those lesions which affect the afferent paths. They affect bladder function by reducing normal sensation so that the patient is unaware of the degree of filling of his bladder. This leads in time to infrequent voiding and thus to overdistention, which, in turn, causes pressure atrophy of the bladder wall and dilatation of the internal sphincter. Urination is at first infrequent, then difficult, and finally involuntary (overflow incontinence).

Such disturbances are seen in lesions of the frontal lobe (if bilateral), of the caudate nucleus, in tabes dorsalis, multiple sclerosis, syringo-myelia, subacute combined sclerosis (pernicious anemia), in transverse myelitis (traumatic or infectious), and in the congenital defects of the spinal cord, peripheral nerves, or ganglia which are often associated with spina bifida.

If the sensory lesion is complete so that the bladder is totally anesthetic (traumatic myelitis) little more than the establishment of an automatic bladder can be sought; if the sensorium is disturbed, the catheter is usually required. If, however, the sensorium is intact and the destruction of sensory paths incomplete, much can be done.

In early cases without secondary changes in the bladder wall, the patient should be trained to urinate at regular intervals day and night to prevent overdistention.

In more advanced cases with but little local damage, especially during the exacerbations often seen with complicating diseases, a period of intermittent or continuous catheter drainage coupled with training will often relieve the difficulty.

In advanced cases with atrophy of the bladder wall but with a remnant of sensation, drainage alone cannot restore the expulsive force sufficiently to permit emptying of the bladder. Here we may take advantage of the fact that the hypogastric or presacral plexus carries sympathetic fibers which transmit inhibitory impulses to the bladder. Richer, Learmonth, and others have shown that division of these fibers will "remove the brakes" and permit even a damaged bladder to empty itself if some sensation remains, and if no obstacle to urination exists (prostatic hypertrophy).

The first case is that of a boy of fourteen with a lifelong history of nocturnal enuresis and urinary frequency culminating two years before admission in an overflow incontinence. There was an associated spina bifida occulta but no evidence of a lesion of the spinal cord, thus indicating that there was a lesion of the bladder nerves or ganglia, presumably in the form of a dysplasia or developmental anomaly. Since a six weeks' period of catheter drainage yielded no benefit, a presacral neurectomy was done and supplemented, because of advanced atrophy of the bladder wall, with a cystostomy. After the cystostomy had closed, the patient was taught to void at three-hourly intervals day and night. Eleven months after operation the residual urine was fifteen cubic centimeters; there was no incontinence except if he failed to get up and void during the night. On such occasions he usually wet the bed toward morning.

The second case is a male of twenty-five years who had an infectious myelitis in 1927, with anesthesia to the umbilicus, paraplegia, and urinary retention. These symptoms slowly disappeared except that the patient was unable to tell whether his bladder was full, and was incontinent almost daily.

Examination in November, 1933, showed hypesthesia below the level of distribution of the eleventh dorsal segment of the cord, 250 c.c. of residual urine, and cystoscopic evidence of neurogenic vesical dysfunction. Training and intermittent catheterization proving of no avail, presacral neurectomy was done. Postoperative use of the indwelling catheter resulted in an acute prostatitis and epididymitis, so that a cystostomy was done and maintained for six weeks. It was then allowed to close, and regular urination was instituted. The residual urine upon dismissal and six weeks later was fifteen and five cubic centimeters, respectively. There was no incontinence.

In conclusion I wish to emphasize that the successful use of presacral neurectomy in these cases depends, first, upon the presence of some remnant of sensation in the bladder; second, upon the provision of adequate bladder drainage in the postoperative period; and last, upon training the patient to remember that his bladder will always be abnormal so that he must empty it regularly, by the clock, both day and night, in order to prevent its redistention and the development of an irreparable atrophy of its muscular wall.

THE EMPLOYMENT OF CYCLOPROPANE ANESTHESIA

DR. RALPH T. KNIGHT: In October, 1933, at the Congress of Anesthetists at Chicago, Ralph Waters and his associates in anesthesia at the University of Wisconsin, gave the first comprehensive report of the clinical use of cyclopropane as an anesthetic gas. Their report was published in the March-April number of *Current Researches in Anesthesia and Analgesia.*

The following is a brief review of this report:

Cyclopropane is C_3H_6, an isomer of propylene. It is given its name because of its cyclic structure, a three carbon ring, each carbon atom bound to each of its neighbors by a single bond and each carbon atom having two hydrogen atoms attached to it. As there are no double bonds it is much less explosive than ethylene, which is C_2H_4 with the two carbons bound by a double bond. Cyclopropane is, however, explosive in concentrations between 20 per cent and 70 per cent with oxygen. It is not at all explosive below 20 per cent

with oxygen. As this concentration is seldom reached and is probably never necessary, the explosion hazard is practically negligible. Fourteen to 16 per cent in oxygen produces good deep anesthesia.

Henderson and Lucas, of the University of Toronto, in 1929, published a laboratory study of the anesthetic properties of cyclopropane. They gave a very favorable report and noted surprisingly few changes in general bodily metabolism.

Waters, et al., therefore began their work in August, 1930. They were assisted by Dr. M. H. Seevers of the Pharmacology Department and Professor W. J. Meek of the Physiology Department. Ten dogs were subjected to increasing degrees of anesthesia while taking electrocardiographic records. No significant changes were noted until severe respiratory depression was reached. Some were carried to complete apnea, once lasting to six minutes, with spontaneous recovery and without significant electrocardiographic evidence of heart damage.

Waters reported 447 clinical cases. Preliminary medication was the same as for other anesthetics. Failure to obtain complete relaxation when needed occurred only twice. Surgical anesthesia was obtained in five or six minutes. Recovery of consciousness required only the same length of time in most cases. The signs of anesthesia were the same as with ether except that eye signs of deep anesthesia did not develop as early. Respiratory signs were therefore even more paramount.

Waters, et al., conclude that:

a. The gas was found satisfactory as an anesthetic agent, particularly since adequate muscular relaxation is obtained with concentrations of less than 20 per cent in oxygen.

b. Laboratory experiments show it to have no more effect on vital functions than anesthetic agents now in common use.

c. Technic of administration and signs of anesthesia differ somewhat from those of other agents.

d. Post-operative complications compare favorably with those of other agents under similar conditions.

e. The gas has no undesirable physical properties and although explosive, is less so than ethylene.

f. Its use is still in the experimental stage and it should not be put into general use for another year.

We have begun the occasional use of cyclopropane and I am including in these very few cases those given at the Minneapolis General as well as those given at the University Hospital. The Minneapolis General Hospital sent me to Madison to observe the use of cyclopropane by Waters and his associates. I have given cyclopropane nineteen times for the following operations: thoracoplasties (2); tumors of the chest wall (2); resection of the pancreas and splenectomy (1); cholecystectomies (2); appendectomies (3); colostomy (1); salpingectomies with suspension of uterus (4); hernioplasty (1); colporrhaphy (1); amputation of foot (1); cast (1).

Cyclopropane was ideal for the chest cases because, with the limited ventilation possible, they were thoroughly oxygenated by the high concentration of oxygen possible with this anesthetic. It was also ideal for all of the pelvic cases. Although two of them were nulliparas they were all perfectly relaxed by the cyclopropane alone. This was also true for the colostomy, hernia, colporrhaphy, amputation, and cast.

The patient who had the resection of the pancreas and splenectomy was a large, muscular young man of thirty, weighing over 190 pounds. Such an operation on such a patient is a severe test for any anesthetic. The line of incision was first infiltrated with novocaine. The operation lasted over two hours and the cyclopropane without ether gave sufficient relaxation throughout the entire procedure, including the closure. The novocaine was probably not necessary as none had to be added for the closure.

Of the two cholecystectomies, one required the addition of one-half ounce of ether for sufficient relaxation for the closure. Both were infiltrated with novocaine for the incision. The relaxation in both was entirely sufficient for the exploration and operative work.

Of the three appendectomies, one required nothing but the cyclopropane. One required the addition of ether to secure enough relaxation. The third was a cyclopropane failure. The patient became so rigid that the anesthetic was changed to ethylene and ether. This was one of the first trials and I know now that the failure was caused by too great concentration of cyclopropane during induction and too early incision. Even the chest became so rigid that artificial respiration had to be done. This was not due to over-anesthetization.

It is easy with cyclopropane to carry the anesthesia to cessation of respiration. There is a considerable margin of safety beyond this, however, as the patient is always so abundantly oxygenated that his color remains beautiful for several minutes without breathing. This happened twice in our small series and a few compressions of the gas bag caused the resumption of respiration. With a little experience in handling the gas, and with the realization that chest movement fades out before the diaphragm is affected and that the eye signs of deep anesthesia do not occur, the deep margin can be avoided. Some of the patients were nauseated and a few vomited immediately upon waking, but in none did this continue.

The advantages of cyclopropane are:

1. Relaxation can be accomplished which no other gas is capable of producing. Many abdominal operations can be performed without ether.

2. It is a very pleasant gas to take.

3. No toxic effect upon the organs has been demonstrated.

4. It is given in very low concentration, 10 to 20 per cent in high concentration of oxygen.

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AN EXPERIMENTAL STUDY IN THE PREVENTION OF INTRAPERITONEAL ADHESIVE FORMATION

DR. C. E. REA (by invitation): The purpose of this paper is to compare the value of certain substances in preventing peritoneal adhesions in rabbits.

The etiology and pathology of peritoneal adhesions have been so carefully described by Benjamin, Ochsner and Garside, and Warren that these features will not be discussed.

Methods to prevent postoperative adhesions have interested the surgeon since the beginning of aseptic surgery. In the comprehensive reviews of Kubota and Ochsner and Garside, it is surprising to note the number and variety of substances that have been used. Since the formation of adhesions is part of the normal process of repair, the problem is not so much that of prevention as one of limitation of the repair process during the healing stages. The means to limit postoperative adhesions may be divided into four classes:

1. The use of greasy or oily substances, as liquid paraffin, vaseline, or acacia, to cover the denuded peritoneal surfaces. Experimentally, however, these substances tend to increase rather than decrease adhesions (Ochsner and Garside).

2. The administration of drugs to augment intestinal activity during the immediate postoperative stage. Drugs like pituitrin, physostigmine, castor oil, and strychnine have been used. The fact that pericardial adhesions will develop in spite of the constant motion of the heart and the danger after certain operations of perforation of the gut due to too violent peristalsis casts much doubt on the efficacy of this form of treatment.

3. Introduction of dilute solutions of tissue digestants. Kubota in 1922 first used papain to prevent postoperative adhesions experimentally and reported favorable results. Ochsner and Garside found that if preexisting adhesions were divided in the peritoneal cavities of dogs and solutions of trypsin or papain introduced, few or no adhesions formed in 42.28 per cent and 90.89 per cent of cases respectively. Of sixteen rabbits which had trauma and iodine and papain solutions introduced intraperitoneally, 93.75 per cent developed few or no adhesions. The effective concentration of papain used was solutions of 1-50,000 to 1-100,000. Papain is more effective than trypsin as the latter is inactivated within two hours when placed in the peritoneal cavity.

4. The use of fluids slowly absorbed from the peritoneal cavity with a view to separate mechanically the loops of bowel. Trusler, Johnson and Warren reported very favorable results with amniotic fluid. The last two authors found that adhesions were prevented experimentally in over 80 per cent of cases. The mechanism of the action of amniotic fluid has been interpreted differently by various writers. Johnson describes its action to an immediate production of a protective layer of fibrin with an accompanying moderate leukocytosis. Permanent adhesions are prevented by the rapid resolution of the exudate by the proteolytic ferments of the leukocytes. Warren believes that amniotic fluid decreases oozing from the tissues, which lessens the amount of blood and fibrin, and therefore lessens the probability of adhesions. Also he states the fluid is absorbed slowly and acts as a lubricant between eroded surfaces. Trusler believes that it stimulates the peritoneum to a more powerful defensive reaction and stimulates a more rapid proliferation of endothelial cells. Lacey could not duplicate Warren and Johnson's results but concluded that, while amniotic fluid could not be depended upon to prevent adhesions, it was harmless when introduced into the peritoneal cavity, and possibly did lessen the density of the adhesions.

Saline, sodium citrate, air, defibrinated blood, hypertonic glucose, blood serum, and ether, are some of the other substances that have been used. Saline and sodium citrate are probably absorbed too quickly to be of much value. Ochsner and Garside found saline to be effective in preventing adhesions in 13.32 per cent of experimental cases. The danger in using hypertonic glucose is not only that it is an excellent culture medium, but also tends to dehydrate the patient. Defibrinated blood and blood serum are also good culture media and there is the possibility that thrombokinase liberated from the injured endothelial cells may clot the defibrinated blood; the clot will then be organized, increasing instead of decreasing the number of adhesions. Air and ether have been little used. Too much ether will tend to increase the narcosis, perhaps dangerously so; too little ether will probably evaporate before the abdomen is closed.

In this study the following substances were compared with regard to their relative effectiveness in preventing peritoneal adhesions in rabbits; defibrinated ox blood, defibrinated rabbit blood, amniotic fluid (dog), amfetin,* sodium ricinoleate (1 per cent), air, air and amfetin, air and sodium ricinoleate (1 per cent), blood serum of the dog, ether, hypertonic glucose, normal saline, papain 1-50,000. The solutions were sterile and 20 c.c. were used unless otherwise stated. About ten rabbits were used in each series. In the four best series the effectiveness of the substance was studied in another ten rabbits, making a total of twenty animals in these series.

To produce adhesions, the following method was used: the peritoneum and intestines were roughened by scraping with a knife or rubbing with gauze, and the raw surfaces painted with tincture of iodine. The amount of iodine applied is empirical but is important with regard to operative mortality. In twelve animals so treated (controls), two died from the procedure, and of the ten surviving, nine developed peritoneal adhesions (90 per cent).

Animals were allowed to live one week before being killed and the peritoneal reaction studied. Adhesions were graded as slight, medium, or dense. The substances to prevent adhesions were introduced into the peritoneal cavity after the iodine was applied.

The four substances that were most effective in preventing adhesions in this study were: sodium ricinoleate

*Lilly's trade name for amniotic fluid.

(1 per cent), 85 per cent; papain 1-50,000, 75 per cent; amfetin, 70 per cent; defibrinated rabbit's blood, 65 per cent.

Sodium ricinoleate, or castor oil soap, not only prevented adhesion most often, but has the added advantage of acting in either a sterile or infected peritoneum. Ochsner and Garside demonstrated that papain and trypsin are inactive in the presence of infection. Its action on bacteria is a surface tension phenomenon; it destroys the cell membrane of the bacteria (Larson). While B. coli and Cl. welchii will grow in sodium ricinoleate, papain, amfetin, and defibrinated blood, they are rendered nonpathogenic by sodium ricinoleate. Its action in preventing adhesions, except for its effect in limiting bacterial growth, is not clear. The manner in which it works is more than by just mechanical separation of the bowel, for in rabbits most of it is absorbed within one hour (B. Olson). Studies on the peritoneal fluid of rabbits using supravital staining methods (neutral red) would suggest that half the histiocytes are either killed or injured by the sodium ricinoleate, judging from the amount of dye in these cells. Thus, sodium ricinoleate may destroy the cell membrane of the histiocytes as well as bacteria, thereby limiting the repair process. It emulsifies fibrin in vitro; papain actually digests fibrin, while amfetin and defibrinated rabbits blood have no effect.

Cultures were taken from the peritoneal cavity before and after the adhesions were produced. It is interesting that some type of bacterial growth was cultured from the peritoneum in approximately half (forty-two out of seventy-nine) of apparently normal rabbits before the trauma and iodine were applied. The technic was checked by members of the Departments of Surgery and Bacteriology and no errors could be detected. Controls were taken routinely from the applicators and media. For the most part the growths were mixed cultures of Gram-positive and -negative rods and cocci; B. coli was never found. For want of a better explanation these positive cultures are considered contaminations. At death all cultures of the peritoneal cavity showed some growth; 20 per cent of the cultures showed B. coli and 15 per cent Cl. welchii. However, in three of the nine cultures taken from rabbits that had received sodium ricinoleate, there was no demonstrable growth, and one of these had shown a positive culture of mixed organisms before operation.

Clinical experiences with the above substances are limited. Johnson used amniotic fluid in sixty-five cases of cesarean section and 30 clean laparotomies and reported favorable clinical results. Oschner and Garside used papain and trypsin in fourteen clinical cases but the time of observation was too short to judge the end-results. It is the practice of this hospital when sodium ricinoleate is used to put 60 c.c. in the peritoneal cavity. Our clinical results with it, amniotic fluid, and papain are too meager to draw conclusions. However, since in this study sodium ricinoleate was more effective than the latter two drugs in preventing peritoneal adhesions in rabbits, its further clinical use would seem warranted.

PERSONAL EXPERIENCES WITH SPLENECTOMY

DR. OWEN H. WANGENSTEEN: The Ancients spoke of the spleen as being full of mystery. Pliny, the elder, in his "Natural History" stated that the spleen "had a property to hinder man's running," and thought that the spleen probably removed melancholy from the blood, and believed that "those possessed of intemperate laughters always had great spleens." Shakespeare was not unaware of these attributes of the spleen, for in "Twelfth Night," Maria as she ridicules the feigned mirth of Malvolio before Sir Toby says, "If you desire the spleen and will laugh yourself into stitches, follow me."

Richard Burton in his "Anatomy of Melancholy" denominated the spleen as the source of hypochondriacal melancholy, which impression is more in accord with the modern version that anger, ill-humor, malice, and spite may be given vent from the spleen.

Functions of the Spleen: The functions of the spleen have to this day resisted full understanding. We know that its removal is compatible with good health. Recent investigations by physiologists have shown that in the dog, at least, it is perhaps the most erectile tissue in the body, capable of enormous alterations in size. The spleen is the dominant organ of the reticulo-endothelial system. It frequently participates in diseases of the blood, lymph nodes, and liver. Enlargement of the spleen in acute and chronic infections and toxic conditions is a not infrequent event. Correlation of pathologic alterations in the spleen with clinical syndromes for which the diseased spleen may be responsible yet remain to be established. The diseased spleen gives rise to a variety of disorders of health, some of which may be effectually terminated by excision of the spleen.

Indications for Splenectomy.—The diseases of the spleen which are most amenable to cure by splenectomy are (1) hemolytic icterus, (2) purpura hemorrhagica, and (3) Banti's disease or splenic anemia. Rupture of the spleen with immediate or delayed hemorrhage, cysts, hydatid and non-parasitic, as well as benign and isolated malignant tumors of the spleen occasionally compel its excision. The spleen has been excised with success for aneurysm of the splenic artery and improvement has followed its excision in primary tuberculosis of the spleen as well as for the stubborn anemia of syphilis occasionally attended by unusual splenomegaly. Roentgen treatment has supplanted splenectomy as a palliative measure in the leukemias. Excision of the spleen in polycythemia and cirrhosis of the liver would no longer appear to be justified.

Technic of Splenectomy.—The spleen may be excised under inhalation or spinal anesthesia. My own preference, unless some complicating condition contradicts its administration, is ethylene supplemented with ether. In the eleven splenectomies which I have done, spinal anesthesia was employed almost as frequently as inhalation anesthesia, and in most instances with complete satisfaction. In two cases, however, in which the spleen was adherent to the diaphragm, discomfort and nausea were provoked, necessitating reinforcement with ethylene. A transverse subcostal or left rectus

incision may be employed. My own preference is for the rectus incision with a horizontal extension of the incision to the left when the spleen is large and the exposure is inadequate.

Balfour's* lucid and beautifully illustrated article on the technic of splenectomy has become the standard guide for the excision of this organ. The ease or difficulty of excision of a pedicled organ depends largely upon how readily it may be mobilized. It is essentially the lienorenal ligament that tethers the spleen, aside from abnormal adhesions which may occasionally be present. It has been my experience that the division of this ligament on the postero-lateral aspect of the spleen permits of its dislocation upon the abdominal wall. It is a good plan to divide the gastrosplenic omentum in which course the vasa brevia before the spleen is mobilized. Then, when the spleen is lifted up onto the abdominal wall, the splenic vessels alone remain to be dealt with. Whenever possible, especially in large spleens, ligation of the artery before the veins permits of saving the patient blood. Six years ago, I first employed division of the lienorenal ligament to mobilize the spleen. Previous to that time, the delivery of a large spleen had been much of a wrestle for me. Inasmuch as these patients frequently have discomfort from distention, it is a good plan to apply suction to an inlying duodenal tube to prophylactically prevent its occurrence. The patient may be sent to the operating room with the tube in place. Should there be any gaseous distension of the stomach, suction can be employed during the operative procedure.

Complications from Splenectomy.—The only serious complication observed in these eleven cases was an unusual shock coming on about ten hours after splenectomy for Banti's disease in a patient (Mrs. A. V.) in whom the operative blood loss had been minimal. Hemopneumothorax with displacement of the mediastinum was present. The removal of the blood and air from the left thorax served to relieve the shock, but mild negative pressure had to be maintained by suction to combat the broncho-pleural fistula. The patient later developed an empyema which cleared up with rib resection. In this patient, dense adhesions between the diaphragm and the spleen were present. In arresting the bleeding from one of these adhesions the diaphragm was pulled upon, and in turn probably the pulmonary ligament, with an ensuant small tear in the lung. One patient in the group developed an incisional hernia which was subsequently successfully repaired.

Results of Splenectomy.—There was one hospital death in this series. A young girl (V. H.), aged 12, with a fairly typical picture of purpura hemorrhagica was operated upon for the removal of her spleen, which weighed only 143 grams. The platelet count which had been 83,000 prior to operation mounted to 400,000 with corresponding improvement in the bleeding time. Twelve days after operation, despite a number of transfusions (11 in all) the patient died with diffuse hemorrhage throughout both lungs and the intestinal canal. Interesting postmortem findings were the absence of ovarian tissue and the presence of a congenital defect of the aorta.

Eight years ago a patient operated upon here by the late Dr. Law had a similar fatal outcome from persistent bleeding despite a number of transfusions after splenectomy for typical thrombocytopenic purpura.

Two other patients in this group of eleven had splenectomy for purpura hemorrhagica and have remained well.

Splenectomy was done twice for hemolytic icterus. Both patients apparently have been cured of their anemia and jaundice by the removal of their spleens, though in both instances there has been persistence of abnormal fragility of the red cells and a microcytosis. The largest spleen removed in this series was from one of these two patients with hemolytic icterus, the spleen weighing 1,720 grams. It contained in addition 350 grams of blood which came out after removal of the ligature on the veins despite preliminary ligation of the artery. Two accessory spleens the size of hazel and walnuts respectively were also removed. Failure to excise a spleneculus may be followed by marked enlargement of these small accessory bodies.*

In four patients the spleen was removed because of Banti's splenic anemia. All have remained well, though two have had subsequent hemorrhages. One patient (Mrs. M. B.), aged twenty, whose spleen was removed five years ago had two gastric hemorrhages in the year following, but she has been quite well since. M. E., a girl of eight, operated upon three years ago, whose removed spleen weighed 350 grams, had a moderate intestinal hemorrhage last summer.

In two patients I removed the spleen for cirrhosis of the liver six years ago, doing a Talma-Morison omentopexy at the same time. The splenectomy was done with the thought in mind that if the removal of an enlarged spleen in Banti's anemia would obviate the development of cirrhosis of the liver its removal in cirrhosis (in which condition the spleen possibly played an etiologic role) migh serve to inhibit further progress of the disease. Since the appearance of the paper of Rowntree, Snell and Chapman and the thesis of Henrickson, one can readily appreciate that there is little justification for such optimism. One of these patients died two years later with typical clinical evidence of liver insufficiency; the other is still alive and well. A brother of this latter patient has subsequently developed a cirrhosis and has done equally as well on medical management.

Comment.—The best results in excision of the diseased spleen are to be observed in hemolytic icterus. The anemia and jaundice are cured by splenectomy even though the abnormal fragility of the red blood cells and the microcytosis persists. The next best results are to be obtained in early instances of splenic anemia before cirrhosis has developed. Occasionally, however, even in the ascitic stage, splenectomy is followed by cure as in the instance of the case reported by H. B. Sweetser, Sr.§ As a group, however, the re-

*Surg., Gynec. and Obst., 23:1, 1926.

*Eccles & Freer: Brit. Med. Jour., 2:515, 1921.
§Surg., Gynec. and Obst., 33:201, 1921.

sults in true purpura hemorrhagica are better than in the whole group of cases catalogued as Banti's splenic anemia. A few patients with thrombocytopenic purpura die of hemorrhage despite excision of the spleen. In such instances the spleen is probably only a part of the mechanism which serves to destroy the platelets. Excision of the spleen should be done wherever feasible in a non-bleeding phase, for the risk of splenectomy as indicated by a number of operative series† is high when splenectomy is done for acute purpura. Kaznelson's advocacy of splenectomy for purpura‡ on the assumption that the spleen was destroying the blood platelets is a brilliant example of the success in medicine of the empirical method supported by critical observation and good rationalization. The customary lag in the acceptance of new methods encountered no exception in this instance, for it was almost seven years (1923) before the first splenectomy was done for purpura hemorrhagica in America.

Discussion

DR. E. A. REGNIER: The diagnosis of thrombocytopenic purpura is oftentimes very difficult. The differential diagnosis must be made between real purpura and aplastic anemias and so-called aleukemic leukemia. I recall a case of a child that had been studied on the pediatric service at Minneapolis General Hospital for a period of four weeks by the pediatric staff. The child had numerous transfusions. The body was covered with purpuric spots and the child was bleeding from the gums. The spleen was markedly enlarged. After numerous blood studies, including consultation with Dr. Downey, a diagnosis of thrombocytopenic purpura was arrived at. I removed the child's spleen. The operation was not difficult. The patient did well for forty-eight hours. The platelet count rose rapidly only to drop again after forty-eight hours. At that time the child again began to hemorrhage from the gums and numerous transfusions kept him alive for two weeks. It was not until tissues from the autopsy were checked that a diagnosis of aleukemic leukemia was made. Many of the blood dyscrasias show purpuric tendencies and the differential diagnosis is oftentimes extremely difficult.

DR. MARTN NORDLAND: I want to call attention to one point in the technic of splenectomy which Dr. Wangensteen referred to, and that is, the importance of applying a ligature to the artery before applying the ligature to the vein. In many cases where this operation is indicated the patient is anemic. By applying the ligature to the artery first and then allowing a little time for the spleen to empty itself through the vein, much blood is conserved for the patient.

Splenectomy is usually well tolerated by the average patient. I recently repaired a large diaphragmatic hernia and in mobilizing the contents of the hernia the spleen was injured to such an extent that I found it necessary to remove it. The patient made a very nice recovery.

†Whipple: Surg., Gynec. and Obst., 42:329, 1926. Anschütz: Beitr. z. klin. Chir., 142:1, 1928.

‡Wien. klin. Wchnschr., 29:1451, 1916.

DR. IVAR SIVERTSEN: In the cases of so-called congenital splenic disease (hemolytic jaundice), I think a transverse incision in the upper abdomen is very valuable inasmuch as you frequently find gallbladder disease or gallstones present and when these are present you can remove the spleen as well as the gallbladder. I have seen several cases of this kind.

There is one other thing which was not mentioned, the question of secondary hemorrhage coming on after cases of splenectomy. This is a very dangerous condition and a hemorrhage of this type may come on as late as two weeks following the operation.

DR. OWEN H. WANGENSTEEN: The difficulty of always definitely ascertaining whether we are dealing with true purpura hemorrhagica is apparent from what has been said. At times in a fatal hemorrhagic dyscrasia, we hear reverberations of discussion from pathologists long after the patient is dead as to the exact nature of the disease which caused his death. It is immediately apparent, therefore, that the clinician with more limited means of examination at his disposal than the pathologist may have difficulty at times in adequately differentiating purpura hemorrhagica from secondary purpura, aplastic anemia, or aleukemic leukemia. If the surgeon will refrain from operating whenever possible in the acute phase of purpura, he will not often fall into error. However, patients may bleed to death despite all conservative agents which one can muster to combat the bleeding of thrombocytopenic purpura. Two patients with purpura hemorrhagica have died in this hospital of cerebral hemorrhage while under medical observation and treatment for bleeding. One can not, therefore, despite the admittedly high mortality of splenectomy in the acute phase, categorically say that he will not operate for acute purpura.

Dr. Nordland spoke of excision of the spleen as an adjunct measure in the course of other operations. In two types of operative procedure, I have found it necessary to excise the spleen as a means to facilitate surgical approach, viz., in total gastrectomy for cancer and in the excision of a tumor of the distal end of the pancreas for hyperinsulinism. I have had one successful total gastrectomy which necessitated excision of the spleen. An interesting observation in his case was that his hunger sensations and pangs were in every particular similar to those which he experienced before the stomach was excised. The patient with the adenoma of the pancreas was recently operated upon and is still in the hospital. The spleen was excised to render easier the identification and excision of a small tumor on the dorsal aspect of the distal third of the pancreas. His blood sugar, which had been persistently low (15 to 50 mgm. per 100 c.c.) before operation, despite a large number of daily feedings, has hovered about the upper limit of normal since operation and the patient is convalescing nicely.

In addition to avoiding injury to the stomach in splenectomy, one takes great care not to include the tail of the pancreas in the ligature. The experience of a number of surgeons in excising the tail of the pancreas for hyperinsulinism would indicate that when

the stump of the pancreas is properly covered by omentum it is a fairly safe procedure.

The other indication for which it may be necessary to excise the spleen in the course of another operation is traumatic diaphragmatic hernia. I once saw the late Professor Küttner of Breslau employ the spleen as a plug to help close the rent in the diaphragm after repositing a large portion of the herniated abdominal content from the thorax back into the abdomen.

In some of the first splenectomies done by Sir Spencer Wells, mention is made of the danger of secondary hemorrhage. It is my impression that these were probably due to mass ligature of the splenic pedicle. If the spleen is well mobilized so that ligatures may be placed on the individual vessels in the splenic pedicle, without the employment of the commonly practised three-clamp technic, I believe that secondary hemorrhage would be most unlikely. In my experience it has never been necessary to leave a pack in the wound to control bleeding or to leave clamps on the splenic vessels. It is my impression that in the splenomegaly of Banti's anemia one is more likely to encounter trouble with vascularized adhesions to the diaphragm than in any other splenic enlargement. My experience with such a case is cited in the paper.

As far as the incision in the abdominal wall is concerned, I believe one might use any of the commonly employed incisions with complete satisfaction. Patients with hemolytic icterus, as Dr. Sivertsen pointed out, frequently have gallstones. My preference, however, would be to deal with the gallbladder secondarily. I do not believe it wise to contemplate any other major surgery during the course of splenectomy for splenomegaly. Dr. Archa Wilcox of this city successfully removed the spleen in an infant of fifteen months for hemolytic icterus, the youngest on record, I believe.

The problem in diagnosis which would present itself in a patient with hemolytic icterus having also a stone in the common duct would be a real one; for we are all wont to feel that the distinguishing feature of the jaundice of hemolytic icterus is that these patients have no bilirubin in the urine despite an occasionally rather high value for bile pigment in the blood. The increased fragility of the red blood cells, however, should serve to differentiate. In a patient who had had the spleen removed by Sir Spencer Wells in 1887, Lord Dawson, in 1914, still found the red cells abnormally fragile in the patient. Spencer Wells had pioneered here too, before the signposts marked the way; for it was only in 1907 that Chauffard pointed out the abnormal fragility as the characteristic finding in the jaundice of congenital hemolytic icterus, and it was not until 1912 that Banti and Eppinger independently urged splenectomy as a curative measure for the condition.

The blood destruction in the hemolytic crisis of hemolytic icterus is often startling. The boy with the 1,720 gram spleen had a crisis on the day on which he was first scheduled for operation. His hemoglobin on entry was 55, and he was given 600 c.c. of blood without reaction on the day prior to scheduled operation. The temperature rose to 104.4° F.; operation was postponed and the next day the hemoglobin was 45. Two weeks later, he was readmitted for splenectomy and, under the sole influence of the aid so often invoked by Ambrose Paré, the hemoglobin was found to have risen to 78.

Dr. Kenneth Bulkley: Dr. Nordland, it has been my privilege, for a period of two years, to serve as President of the Minneapolis Surgical Society. The duties which this position has imposed upon me have always been a pleasure and I wish to take this opportunity to express my gratitude to the members of the Society, to its Executive Committee, and to its highly competent and able Secretary, Dr. Olson, for the splendid coöperation which has contributed so largely to whatever success the Society has attained during the period of my incumbency.

One further duty rests upon me and in order to fulfill it I have asked Dr. Maxeiner and Dr. Olson to at this time escort you to the rostrum.

Dr. Nordland, I take great pleasure in handing you herewith, as badges of your office, two objects. As I give them into your charge may I wish you all success in your tenure of office as President and assure you that as a member of your Executive Committee for this coming year I will do all in my power to help you make this Society continuously successful. I first hand you the Presidential portfolio. And now, in turning over to you the Presidency, may I present you with this gavel, the symbol of your authority over us for the coming year. Congratulations!

Dr. Martin Nordland: Dr. Bulkley and members of the Minneapolis Surgical Society: On this occasion I wish to express my sincere appreciation of the honor the Society has bestowed upon me in electing me President of this organization. Since my election to membership in 1923, I have considered it a privilege to attend and take part in the meetings. I feel that the Society has done much for me. It has been interesting to watch the progress of this organization. I believe that you will agree with me that the Society has assumed a position of unusual importance in the Twin Cities and in the State. During its development many of our illustrious members have been Presidents of this organization and to them should be given the credit for its marvelous development.

I feel that it will be particularly difficult to follow in the footsteps of such an efficient leader as we have just had in Dr. Bulkley and I feel that it will not be easy to "fill his shoes."

I realize that it is a privilege of the President to call upon other officers of the organization to assist him in the duties he must perform. It is my good fortune to inherit, as my first lieutenant for the coming year, our very industrious secretary and treasurer, Dr. Fred Olson. With his help I already have a good start.

I want you all to know I feel very highly honored to be elected to this position and I will do my best to make this year a success.

I thank you.

Respectfully submitted,

F. A. Olson, M.D.,
Secretary and Treasurer.

Of General Interest

Dr. Roy F. Raiter, of the firm of Drs. Raiter & Raiter, Cloquet, Minnesota, sailed on July 28 for Vienna, Austria, where he will take a three months' post-graduate course in surgery.

Two Minneapolis physicians appeared on the program of the North District Medical Society of Wisconsin at their meeting held August 15, 1934, at Pine Crest Lodge. Dr. J. K. Anderson read a paper on "Ischio-rectal Abscess" and Dr. M. O. Henry presented the subject "Supra-condylar Fractures of the Elbow."

Dr. Harry Lee Parker has resigned his post as Associate Professor of Neurology in The Mayo Foundation and consulting physician in the Section of Neurology of The Mayo Clinic to return to Ireland where he has been appointed Chief of Staff of the Neurologic Institute of Southern Ireland and Professor of Neurology, Trinity College, University of Dublin. Dr. Parker is a graduate of the University of Dublin and came to the Mayo Foundation in 1919.

SIXTH ANNUAL MEDICO-MILITARY SYMPOSIUM, THE MAYO CLINIC

The 1934 Medico-Military Symposium for Medical Department Reserve Officers of the Army and Navy will be held at the Mayo Clinic, from October 7 to 20, both dates inclusive.

This is the Sixth Annual Inactive Duty Training Course to be held at The Mayo Clinic and will follow the plan which has proven so satisfactory in past years; the morning hours will be devoted to attending clinics on subjects selected by the student officers, and the afternoon and evening hours given over to work in Medico-Military subjects. The Medico-Military Program will be under the personal supervision of Colonel Kent Nelson, M.C., U. S. Army, Corps Area Surgeon, Seventh Corps Area, and Captain J. B. Mears, M.C., U. S. Navy, District Medical Officer, Ninth Naval District.

The staff and faculty of The Mayo Clinic have placed their unexcelled facilities at the service of their Government in the interest of preparedness and have extended an invitation to all the service to participate. The two weeks' excellent clinical post-graduate work must make a definite appeal to all who are interested in their profession and does not incur as great a loss of time for the private practitioner that normally pertains to post graduate work along professional lines.

Application for this course of Inactive Duty Training should be made either to the Corps Areas Surgeon, Seventh Corps Area, Omaha, Nebraska, or to the District Medical Officer, Ninth Naval District, Great Lakes, Illinois. Applications should state the character of the work the candidate desires to follow in the morning hours. All student officers are expected to attend and participate in the afternoon and evening sessions. Each applicant should fully understand that the invitation to accept this course of study without charge is extended by the Mayo Clinic; that the project is without expense to the Government; and that one hundred hours' credit will be given those who take and complete the course. While it is desirable to attend the entire course, those whose time will not permit this may join or leave at any time and will receive credit for the hours spent in training. Uniforms are optional.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for the Month

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 11:00 o'clock every Wednesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of September will be as follows:

September 5—Athlete's Heart.
September 12—Encephalitis.
September 19—Back in School.
September 26—Progress in Cancer Control.

Interstate Postgraduate Medical Association

The International Assembly of the Inter-State Postgraduate Medical Association of North America will be held in the Public Auditorium, Philadelphia, Pennsylvania, November 5-9, 1934. Many distinguished teachers and clinicians will appear on the program. A major list of the names of the contributors to the program, with other information, appears on page xvi of this journal. All members of the Minnesota State Medical Association are cordially invited to attend. Registration fee of $5.00 admits all members of the profession in good standing.

Invitation to Wisconsin

Meeting at Green Bay on Wednesday, Thursday and Friday, September 12 to 14, the State Medical Society of Wisconsin extends a very cordial invitation to members in adjoining states vacationing in Wisconsin to be guests at its 93rd Anniversary Meeting. All sessions will be held in the Columbus Community Club, Green Bay.

Morning sessions will be devoted to section meetings and clinical presentations with general sessions each afternoon. The President's Address will be given at a smoker Wednesday evening, September 12, while Drs. Olin West, secretary of the American Medical Association, and Dean Dewis, Baltimore, will address the annual dinner on Thursday evening.

Northern Minnesota Medical Association

The Northern Minnesota Medical Association will hold its annual meeting at Brainerd, Minnesota, September 10 and 11, 1934.

This year the Association is being directed by the following officers: Dr. A. C. Baker, Fergus Falls, president; Dr. J. F. Du Bois, Sauk Center, vice president, and Dr. O. O. Larsen, secretary-treasurer.

At the banquet Monday evening, Dr. Scammon will act as toastmaster. Addresses will be given by Professor A. E. Jenks of the University of Minnesota on "Minnesota Man," by Dr. A. C. Baker, president of the Association, and by Dr. F. J. Savage, president of the Minnesota State Medical Association.

The following interesting program has been arranged by the committee, of which Dr. F. J. Hirschboeck is chairman:

ADDRESSES

Fractures: Diagnosis and Treatment in Rural Practice.
H. H. Leibold, Parkers Prairie.
Endocrine Growth and Sex Deficiency.
L. F. Hawkinson, Brainerd.
The Present Status of Dinitrophenol.
Edgar T. Herrmann, Saint Paul.
The Cost of Medical Liability Insurance.
B. J. Branton, Willmar.
Malpractice.
W. H. Hengstler, Saint Paul.
Idiopathic Hypochromic Anemia.
Samuel H. Boyer, Jr., Duluth.
The Diagnosis and Management of Anemia.
J. B. Carey, Minneapolis.
Malignant Tumors Arising from Epithelioma of the Pharynx.
W. T. Peyton, University of Minnesota.
The Treatment of Infertility Associated with Hypometabolism.
C. A. McKinlay, University of Minnesota.
The Jaundiced Patient.
O. J. Hagen, Moorhead.
Report of the Meeting of the American Heart Association.
Robert S. Nelson, Duluth.
Osteitis Fibrosa Cystica.
E. N. Peterson, Eveleth.
The Diagnosis and Treatment of the Various Types of Goiter.
E. H. Rynearson, Mayo Clinic, Rochester.
Cerebral Arteriosclerosis.
E. M. Hammes, Saint Paul.
Recent Therapeutic Advances in Neurology.
J. C. Michaels, Minneapolis.
Non-organic Causes of Fatigue.
Norman Johnson, Minneapolis.
The Prevention of Complications of Prostate Resection.
Gershom Thompson, Mayo Clinic, Rochester.
Recent Progress in Therapy of Heart Disease.
Morris Nathanson, Minneapolis.
Urography with Special Reference to Differential Diagnosis in Kidney Conditions.
Edward Bratrud, Thief River Falls.
Subject not announced.
F. J. Hirschboeck, Duluth.

OBITUARY

George Edward Routh
1847-1934

Dr. George E. Routh of Saint Paul was born in Cincinnati, Ohio, July 23, 1847, the son of Dr. J. W. Routh, a surgeon in the Union Army, who during the War of the Rebellion was post surgeon at Milliken's Bend, Louisiana, on the Mississippi above Vicksburg. His father died in service in 1865 and the care of the family fell mainly on the shoulders of the subject of this sketch.

Dr. Routh's early life was spent in his native state. After receiving his scholastic education, which was obtained in the public schools, he took a full course of medical instruction at the Miami Medical College, Cincinnati, graduating in 1874. Subsequently he took a private clinical course with Professor Carson of Cincinnati, in the hospital wards of that city, making special study and investigation of the subject of the diseases of the throat and lungs. Afterward he engaged for a year in the general practice of his profession in the State of Illinois, and then moved to Austin, Texas, where he was located for several years. He was a member of the Board of Health of the city of Austin, and was appointed a member of the Board of Medical Examiners for the Sixteenth Judicial District. The latter position he held by reappointment for two terms.

In 1883, Dr. Routh, mainly on account of the ill health of his wife and himself, moved to Saint Paul, where he resided to the time of his death. He was first associated with his brother Dr. J. W. Routh, who died in 1886, and later with another brother, Dr. W. W. Routh.

Six years ago Dr. Routh was forced to retire from active practice on account of ill health and died July 23, 1934, on his eighty-seventh birthday.

Edward P. Seguin
1873-1934

Dr. Edward P. Seguin of Eveleth, Minnesota, died May 3, 1934.

Dr. Seguin was born at St. Hyacinthe in the province of Quebec, September 13, 1873. He graduated from the medical department of Laval University in 1899 and was licensed to practice medicine in Minnesota in 1900. Dr. Seguin began practice at Pierz, Minnesota, in 1900 and moved to Bovey in 1912. From there he went to Eveleth in 1925. He served as Assistant County Health Officer for Itasca County for six years and later was Health Officer of Eveleth from 1928 to 1930 and again in 1934.

Dr. Seguin was one of the old school practitioners who in the early years of this century experienced the hardships of frontier practice. His patience, charity and unassuming manners endeared him to his patients and friends. He is survived by his wife, six daughters and four sons.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Books Received for Review

THE SINISTER SHEPHERD. A translation of Giralamo Fracastoro's Syphilidis Sive de Morbo Gallico Libri Tres, by William van Wyck. 85 pages. Illus. Price, cloth, $4.50. Los Angeles: The Primavera Press, 1934.

THE LABORATORY METHOD IN TEACHING PHYSICAL DIAGNOSIS AND CLINICAL HISTORY RECORDING. Logan Clendening, M.D. 72 pages. $0.50. St. Louis: C. V. Mosby Company, 1934.

THE SPASTIC CHILD. Marguerite K. Fischel. With Introduction by George Gellhorn, M.D. 98 pages. Cloth, $1.50. St. Louis: C. V. Mosby Company, 1934.

MEDICINE MARCHES ON. Edward Podolsky, M.D. 344 pages. 1 illus. Cloth, $3.50. New York and London: Harper and Brothers, 1934.

MATERNAL MORTALITY IN FIFTEEN STATES. United States Department of Labor, Children's Bureau, Publication No. 223. Washington: Government Printing Office, 1934.

THE POWER TO LOVE. Edwin W. Hirsch, B.S., M.D. Associate in Urology, College of Medicine, University of Illinois. 363 pages. Illus. Price, cloth, $4.00. New York: Alfred A. Knopf, 1934.